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ABSTRACT

This training module is part of a series that provides a basic introduction to using assistive technology with young children (ages 2 to 7) who have severe disabilities in more than one area of development. This module on education begins with an introduction which outlines the role of technology, myths and realities about technology, members of the technology team, and service delivery models. Subsequent chapters cover: (1) using technology in educational settings; (2) determining an individual's technology needs; (3) integrating technology into the educational curriculum; (4) understanding computers; (5) using computers with preschool children; (6) measuring skill acquisition; and (7) selling others on the merits of technology. Appendixes provide an assistive technology resource list, a list of resources on devices and implementation strategies, descriptions of common types of assistive devices, a list of publishers and vendors of special education software, a list of software for preschool children, and ideas for word processing in special education. A videotape, entitled "Assistive Technology: We Can Do It!," was developed to accompany this module and related modules. (Contains 16 references.) (JDD)

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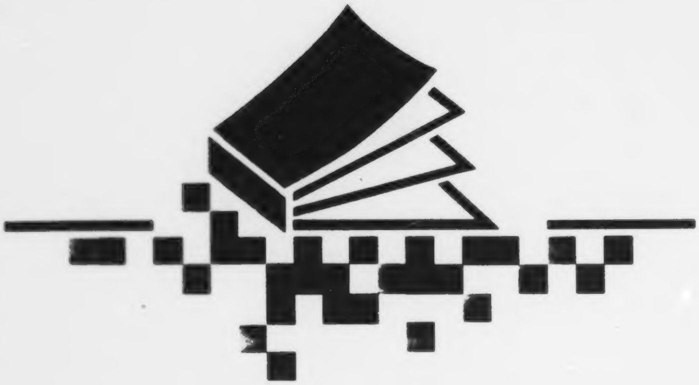

Technology in the Classroom

Applications and Strategies for the Education of Children with Severe Disabilities

Education Module

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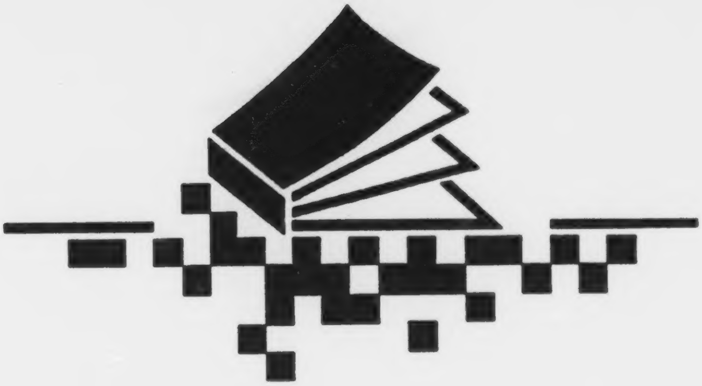

Education Module

Technology
in the
Classroom

Applications and Strategies for the Education of Children with Severe Disabilities

by

E. Lucinda Cassatt-James

edited by

Nancy T. Harlan

Deborah M. Bruskin

American
Speech-Language-
Hearing
Association

September 1992

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Dedicated to the families, teachers, and service providers who are untiring in their efforts to help young children with severe disabilities reach their full potential.

The purpose of this module is to give you information about assistive technology that will be helpful to you and your child or the children you serve. Therefore, make it work for you. Read only what you want to know now; read the rest later when it is pertinent to your needs.

Preface

With the advent of assistive technology, a new world opened up for children with severe disabilities. They now would be able to move about, communicate, and learn, often alongside their able-bodied peers. However, making this technology available to these children and teaching them how to use it was not, and is not, an easy task. How do you go about informing educators and related service providers about the intricacies, challenges, and benefits associated with using technology? How do you help them to become comfortable using assistive devices as tools that can enhance, rather than interfere with, their daily teaching and other responsibilities?

Technology in the Classroom: Applications and Strategies for the Education of Children with Severe Disabilities, a 3-year project funded in part by the U.S. Department of Education, tries to address these questions. The American Speech-Language-Hearing Association (ASHA) designed this project to develop, field-test, and evaluate the effectiveness of self-instructional materials that would improve the knowledge and skills of families, teachers, and related service personnel so that they could use assistive technology effectively in the educational programs of young children with severe disabilities. Development of these materials involved the collaborative effort of many individuals who contributed significantly to the final products.

Authors. These materials were authored by clinicians and teachers who have many years of experience in the field of assistive technology. Sarah W. Blackstone, E. Lucinda Cassatt-James, Elaine Trefler, and Carol Flexer all have seen young children struggle to walk, talk, learn, and listen before most of the assistive technologies available today existed. They know today's technology because their input helped to develop it. It was their vision and creativity that guided the direction of this project. Their respect for children, their skills in determining children's needs, and the depth of their knowledge regarding strategies to use in meeting those needs have been demonstrated in the content of the project materials, along with their ability to share this knowledge in a clear and understandable manner. We all are indebted to these women for their long-term dedication to, and advocacy for, children with disabilities.

Site Coordinators. Two field tests were conducted during the course of the project to help us determine whether the project materials were actually useful in providing families, teachers, and related service providers with strategies for incorporating assistive technologies into the educational programs of young children. A local field test was conducted in Montgomery County, Maryland; we are grateful to Tom O'Toole, Sandra Lebowitz, and Nancy Gould for helping us to conduct this field test and for facilitating a smooth working relationship with public school personnel. The second field test, which was conducted at the national level, was made possible by the willingness and gracious efforts of Peggy Locke in Minnesota, Richard Lytton in Rhode Island, Judy Montgomery in California, and Gail Van Tatenhove in Florida. Not only did they locate the field-test sites and

participants, but with their knowledgeable input they facilitated the fine-tuning of field-test evaluation instruments to better suit potential field-test participants. They also provided valuable input into the structuring of project materials. Their enthusiasm for the project, their care in completing tedious tasks, and their collective sense of humor all contributed enormously to the successful completion of the project.

External Advisors and Peer Reviewers. So many individuals gave freely of their time and energy to review the project materials, each contributing to the preparation of a better product. With heartfelt thanks we acknowledge Mary Brady, Linda Burkhart, Philippa Campbell, Cynthia Compton, Susan Elting, Don Goldberg, David Hawkins, Susan Hough, Mary Blake Huer, Bill Lee, Janice Light, Bill Lynn, Noel Matkin, Shirley McNaughton, Beth Mineo, Marion Panyan, Kathy Post, Susan Quinlisk-Gill, Eileen Raab, Mark Ross, Janis Speck, and Lana Warren.

Internal Advisors. This group (Stan Dublinske, Kathryn Nickell, Cassandra Peters-Johnson, Diane Paul-Brown, Helen Pollack, and Jo Williams) supported the project throughout all of its phases and provided insightful suggestions, for which we are extremely grateful.

Project Staff and Significant Others. Special thanks to Mary Anzelmo for getting the project started, and to Ellen Fagan, ASHA's director of continuing education, for helping us to develop the project's field-test tools that were so effective in demonstrating changes in field-test participants' attitudes. Ellen also was an appreciated counsel with regard to field-test procedures and data analysis. Tarja Carter, director of ASHA's graphic services, and her staff were a source of never-ending talent when it came to preparing text, brochures, posters, module covers, and all project artwork. Joanne Jessen, ASHA's director of publications, and her staff of editors who reviewed the project documents provided advice regarding publication issues and editorial questions. Personal thanks go to Charles Diggs (ASHA's director of consumer affairs) for his counsel in preparing the project videotape, and to Amie Amiot for her untiring efforts in formulating statements about public laws. If it had not been for James Gelatt and Camille Catlett, who were responsible for the original grant preparation, this project never would have begun. Acknowledgment also goes to our project officer, Patricia Hawkins, and the Office of Special Education Programs, U.S. Department of Education, for their continuing support.

Stan Dublinske, director of ASHA's Professional Practices Department, was a constant source of strength with his clear thinking and concise solutions to some of the thornier problems. Cheryl Wohl contributed liberally during the initial phases of the project and carefully saw to the preparation of field-test materials. Many thanks for her continued support.

The project, however, would never have come to completion without the guidance of the project manager, Deborah Bruskin, who held the hand of this project director until she knew the ropes of the National Office and procedures for interfacing with the Department of Education. This moral support continued and made

possible the project's movement through its more difficult times. Her excellent writing skills helped significantly in developing the written materials. Many thanks to a competent colleague and constant friend.

Personally, I have grown markedly from my involvement in the development of this project. Most certainly, it has changed the direction of my professional life, and I sincerely thank all those with whom I have had the pleasure of working for these past months.

We hope that the results of our efforts, including three modules, one supplement, and one videotape, will find their way into the hands of families and professionals eager to meet the technology needs of young children with severe disabilities. We present them to you with some measure of assurance that they will be helpful and that, hopefully, children's potentials will be better realized. In a world of such rapid technological changes, I challenge you to get started now! It may be your own insight and experience that contribute to a second publication of this sort.

Nancy T. Harlan

Nancy T. Harlan
Project Director

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Chapter I Introduction

Welcome to the world of assistive technology! If you are reading this module, you are undoubtedly curious about what assistive technology means and the role of this technology in the education and lives of young children with severe disabilities. As defined by the Education of the Handicapped Act Amendments of 1990: "The term 'assistive technology device' means any item, piece of equipment, or product system, whether acquired commercially off the shelf, modified, or customized, that is used to increase, maintain, or improve functional capabilities of individuals with disabilities." [Sec. 101(g)]. Many of you may be from the "paper and pencil generation" or may have used technology in a business context only. Whether you are a family member, a teacher, or a related service provider, you consider yourself a novice in the use of technology for young children with severe disabilities.

To ease your entry into this new and exciting area, we have prepared a series of modules that provide a basic introduction to using assistive technology with young children (ages 2–7) who have severe disabilities in more than one area of development (i.e., motor, communication, and/or cognitive). However, the content of these materials may be extremely helpful to families, teachers, and related service providers of children who have a severe or even mild disability in only one area of development. The *Communication Module* delves into technology that gives children another way to communicate when speaking is difficult or impossible. The *Positioning, Access, and Mobility Module* gives readers ideas about how to position children comfortably so they can participate in the activities of life, as well as ideas about helping children activate technology and move about even when their arms and legs are inefficient or do not allow them to crawl or walk. The *Education Module* has descriptions of technologies that help children do pre-academic as well as academic tasks—tasks that help them learn how to learn. It also addresses computer terminology and adaptations to computers that make them usable by children with disabilities. A supplement entitled *Listening and Hearing* contains suggestions about hearing technologies and listening strategies that improve a child's opportunities to learn from his or her environments. The accompanying videotape, entitled *Assistive Technology: We Can Do It!*, provides an overview of the technologies and strategies discussed in the written materials and shows children using them successfully in learning environments.

Parents and professionals who reviewed the modules (as part of a national field test) agree the videotape is most helpful when viewed before reading a module. This national field test of project materials also revealed two statistically significant findings: (a) 62 family members as a group and 99 professionals as a group became more comfortable with their knowledge of assistive technology, and (b) the professionals as a group began to feel more competent in using assistive technology. Preliminary findings of a local field test (conducted before the national test) indicated findings similar to (a) above. Follow-up of local field test participants one year later indicated an increase in participants' (a) level of awareness of assistive technology, and (b) efforts to seek additional information and resources about assistive technology. Thus, we present these materials to you with some degree of confidence that they will be helpful.

Role of Technology

Technology has become an integral part of the lives of all children today. Two-year-olds are operating the remote control for the television, turning on lights, and pushing the button on the automatic garage door opener. Three-, four-, and five-year-olds, as well as first and second graders, are operating microcomputer-based toys, such as "Speak and Spell," and are playing computer games at home using their parents' or older siblings' computer.

Assistive technology enables children with severe disabilities to participate more fully in all aspects of life (home, school, and community) and helps them access their right to a free, appropriate, public education in least restrictive environments. Part B of IDEA* states that a child's needs for assistive technology services and devices must be considered by the team formulating his or her Individualized Education Program (IEP) or Individualized Family Service Plan (IFSP). If the team determines that the child needs assistive technology to receive a free, appropriate, public education in the least restrictive environment, the child's IEP/IFSP must include a specific statement of such devices and services, and these devices and services must be provided. This is a landmark decision that allows students with severe disabilities to be fully integrated into the educational system. Although this decision will improve the quality of education for children with disabilities, it also presents a great challenge to the teachers and families, as well as a variety of service providers, who must use the technology to assist these children as they strive to achieve independence in a difficult world.

The perspective of the authors is that assistive technology is an enabling tool that provides access to learning. It is most effective when applied in combination with traditional teaching techniques to achieve the best learning environment for children with disabilities. Alone or in combination with other techniques and strategies, assistive technology is not a panacea for all learning challenges. Experience has shown that a child's ability to operate a piece of equipment has little impact on his or her educational achievement. For example, simply using a switch to turn on a toy does not necessarily mean that an understanding of cause and effect has occurred. This ability is only one of many events in a child's life that may lead to the acquisition of such a basic cognitive skill. Likewise, pointing to symbols on a vocabulary overlay does not spontaneously translate into functional use of those symbols for purposeful communication.

Applied carefully and skillfully, assistive technology can play an important role in meeting the needs of children with severe disabilities. Technology can assist these children in participating in the educational curriculum and in acquiring social skills (now being able to interact with peers and siblings). It can help them master skills needed for independent living. They do not miss out on the fun and excitement of being children.

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* This is an amendment to the Education for All Handicapped Children Act of 1975 (P.L.94-142), which was first amended as P.L.99-457.

Myths About Technology

Myth # 1: Technology limits speech and mobility.

Almost anyone who has had to decide whether a child should be given technology has asked the following questions.

"Won't technology keep children from learning to walk or to talk? Won't it make them lazy so they don't try as hard to develop their abilities?"

- We need to think of assistive technology as *a supplement, not a replacement,* for skills that are not yet present. Assistive technology may actually facilitate the development of skills or at least allow for the development of parallel skills. For example, the lack of mobility could delay cognitive development or social independence. However, with the provision of a mobility system, children can explore their world, fulfill family responsibilities such as getting to the kitchen on time for meals, or participate in school routines such as delivering messages to the school office. If walking for short distances becomes possible, the mobility device might just be used for activities such as playing on the playground at recess. The idea of a "wardrobe of devices" can be helpful (i.e., providing the child with a collection or choice of mobility options). This is not unlike children without disabilities who use various methods of mobility, such as bicycles, scooters, skates, and so forth. It is vital to remember that a specific assistive device can always be discarded if and when a child acquires new skills.
- The early application of augmentative communication approaches does not inhibit the development of speech and language and may actually *prevent the establishment of maladaptive communication patterns* (Blackstone, 1990). If, for example, initial attempts at interaction get off to a bad start (either because the children's communication signals are not being sent or not being received), the probability of the children acquiring an awareness that what they do has a specific effect upon others in their world is very low. This set of circumstances is known to lead to "learned helplessness," behavior problems, or passivity, which constitute major barriers and handicap people well beyond their level of impairment later in life (Abramson, Seligman, & Teasdale, 1978). Assistive technology can facilitate children's communication so that their communication attempts are more accurately understood and responded to.

Viewing the success that other children with similar disabilities have had with assistive technology can be very beneficial. Videotapes, films, written materials, support groups, and live observations can all be helpful in seeing the long-term benefits of technology.

Myth # 2: New technology is very difficult to use.

Many of us are skeptical about our own ability to use complex equipment; just the thought of using assistive technology arouses feelings of anxiety and intimidation. However, it is important to remember that:

- To facilitate your child's use of technology, you do not have to be an expert in using computers or other such "high tech" devices. There are experts who are trained to help you understand how the technology works.
- You learn only the functions of the computer/device that your child needs now. When your child needs a new function, you both can learn how to do it.
- Don't be put off by the terminology that is used when discussing computers or technology in general. As you begin to understand how to make the device work for your child, you will learn the related vocabulary.
- Although the first few steps taken toward the implementation of technology may be difficult, competence comes gradually and will eventually provide you with a sense of accomplishment and pride, both for yourself and for your child.

And there are resources that can help. Federal legislation has mandated that all states be funded to develop consumer-responsive, statewide, technology-related service delivery. Those states funded to date and their respective addresses and telephone numbers appear in Appendix A, "Assistive Technology Resource List." Also included in Appendix A are listings of organizations and agencies that provide assistance about applications of assistive technologies, pertinent publications, funding resources, and databases of assistive technology resources (e.g. manufacturers, products, publications, and services).

Realities About Technology

Reality # 1: Assistive technology is still being developed.

Assistive technologies for young children have not yet been developed/refined to the level of the television or the telephone. Because of this, limitations, "bugs," breakdowns, problems, and irritations exist, and we need to be prepared for them.

Reality # 2: Funding for assistive technology is a challenge.

Although funding is and will no doubt continue to be a challenge, this situation has improved in recent years. Funding sources now include federal and state programs, private insurance, and other sources, such as philanthropic groups. The Funding Resources section of Appendix A contains a list of current manuals and references that can help families and professionals sort through this funding maze. Equipment manufacturers also frequently provide information about funding resources.

Reality # 3: Applications of assistive technology take time and effort.

Utilizing assistive technology is time-consuming. For example, many, many symbol displays/overlays must be developed to enable one child to communicate at school. This child also requires displays/overlays for communicating at home and in the community. The child's communication aid also will require programming. In addition, planning and meeting time must be provided if assistive technologies are going to be fully integrated into a child's learning environments.

As this technology becomes more sophisticated, it also is becoming easier to use. For example, communication symbol displays now can be created and then produced on a printer. Some communication aids can be programmed by pressing buttons and speaking into a built-in microphone. Manuals are user-friendly, and manufacturers offer workshops and videotapes to help people understand how to use the equipment that they purchase.

In spite of these advances, it is necessary for administrators to understand that preparation, planning, and meeting time is needed if assistive technologies are going to help children be successful in reaching their full potential.

Reality # 4: Assistive technology should be used with care.

Assistive technologies are wonderful tools, but if they are used without discretion or inappropriately, they can harmful. For example, providing a child with an assistive listening device without input from an audiologist regarding amplification settings can result in permanent hearing loss. A child using an electric wheelchair without instruction from the occupational or physical therapist may be unable to stop the device before it rolls into a busy street or hits other children. Choosing augmentative communication aids without the expertise of a speech-language pathologist who knows the broad range of options and their suitability for children with different language capabilities can result in such frustration that a child's overall desire as well as ability to communicate may be diminished rather than increased. It is very important to seek out knowledgeable guidance from trained professionals so that the right decisions can be made about assistive technology devices and their applications.

Technology Team

It is essential that decisions about a child's use of technology be made by a team of professionals and family members to ensure that the child will benefit from a broad perspective of knowledge and experience. Members of a child's team change over time; only the child and, sometimes, the family remain constant. Thus, although each team member plays an important role along the way, the job of a team is to empower the child and the family to make decisions, to take control of the process, and to seek out new resources when they need them.

Research and practice suggest that teams function best when roles and responsibilities are clearly delineated. The members who usually make up a child's team are described below*:

- **Child** – Children are the only constant on the team, bringing with them their unique personalities, abilities, challenges, and fantasies. The children are active participants, and their opinions must be respected and valued. After all, they are the ones who will or will not benefit from technology, and will or will not use it.
- **Family** – The family provides support and helps to develop the child's world knowledge base. It is important to realize that many families have concerns unrelated to their children with disabilities that will affect their level of participation. In some cases, cultural issues and existing family dynamics may even inhibit active involvement. Varying degrees of participation are understandable and acceptable. The family can be a child's best advocate and can develop a child's sense of confidence, self-esteem, and independence.
- **Aides/instructional assistants** – These individuals work with teachers to implement the curriculum and make learning possible. They play a key role in fostering peer interaction, self-confidence, and independence.
- **Audiologists** – Audiologists test hearing, recommend hearing technologies, and provide instruction in the use of hearing technologies. They also give suggestions for enhancing children's listening skills.
- **Classroom teachers** – The classroom teacher is responsible for the child's total education program. Teachers must balance the activities and time available during the school day and collaborate with the family and other professionals to ensure that the "educational path" is followed. They develop and implement educational strategies that allow assistive technology users to participate in classroom activities so that functional, academic, and social goals can be accomplished.
- **Occupational therapists** – Occupational therapists, like physical therapists, evaluate children's posture and mobility. Occupational therapists then recommend and implement procedures and devices that will meet seating and mobility needs. In addition, occupational therapists help determine which devices and strategies children can use to access other technologies, such as those for learning and communicating, as well as moving.
- **Peers** – Children's peers may be friends, classmates, helpers, and tutors. Peers provide emotional support and a special link to certain aspects of children's lives in which adults have little involvement. They provide models for learning and communicating.
- **Physical therapists** – Physical therapists evaluate children's posture and mobility and are subsequently involved in recommending and implementing a variety of techniques, devices, and strategies that will appropriately position the children to facilitate their comfort, proper development, and safety, and that will increase their mobility.

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[*] Except for the child and the family, potential team members have been listed in alphabetical order.

- **Physicians** – Physicians address medical issues and monitor medical complications. They are involved in the prescription of the seating and, often, the mobility device. The physician helps to procure funding from third-party payers (e.g., insurance companies).
- **Psychologists** – Psychologists assess children's intellectual abilities and learning styles. They must be skilled at making necessary adaptations to determine a child's cognitive functioning, taking into account present physical disabilities and behavioral characteristics.
- **School principals, directors of special education, superintendents** – These designated leaders have job descriptions that involve management of educational programs and fiscal issues. They are leaders and set the tone. They understand the school system and often can make things happen. They have the authority to allocate staff time as deemed appropriate. Their support is often critical to the successful implementation of assistive technology.
- **Special educators** – Teachers with special education backgrounds develop an in-depth understanding of each child's cognitive profile and learning style as they relate to the curriculum. Based on this knowledge, the special educator can modify curriculum goals and materials and provide additional resource support, such as recommending software that enables children to participate in classroom activities (e.g., art projects, creative writing).
- **Speech-language pathologists** -- Speech-language pathologists suggest ways to maximize a child's speech, language, and communication during each activity (e.g., use of a communication device during circle time and a mini-board at home during bathtime). They often help develop vocabularies, design overlays, suggest strategies to facilitate interaction, and integrate speech and language development into the educational curriculum.
- **Team facilitator** – This individual possesses the knowledge and the skills to coordinate team meetings, ensure follow-through of team goals, see that time lines are met, and generally manage team activities so that no activity deemed important "falls through the cracks."
- **Technical resource personnel** – Rehabilitation engineers and/or technologists and assistive equipment suppliers/manufacturers help make decisions when specific technology is being considered. They can assist in procuring, designing, fitting, and maintaining the equipment and can also help in setting up/modifying equipment and software and designing work stations.

The individuals cited above play an important part in helping children use technology effectively. The roles they play often vary; those who implement the use of technology are not always the same as those who prescribe or design it. The level of expertise among these people in using technology also varies. Each person contributes his or her own unique skills, talents and personality; together they make assistive technology work. And, it is important that teams provide continuity and plan for smooth transitions as the child grows and moves through the educational system.

Service Delivery Models

Service delivery to children with severe disabilities can generally be categorized according to different "models," three of which are described below. Within each model, note how the focus of attention and the responsibilities change. Professionals and families vary as to the model with which they feel most comfortable. As families' needs change or as they learn more about dealing with their children's technology needs, they may change their model of choice. In some settings a certain model may be required, but within each circumstance there should be flexibility to meet the needs of both the children and their families.

- **Family-centered model:** This model is designed to
  - empower and enable the family as a system,
  - promote independence, not dependence, and
  - support and strengthen the family's competence in negotiating its own course of development.

  In the United States, the family-centered approach is an integral part of service delivery in infant and toddler programs with funding under the Individuals with Disabilities Education Act (IDEA).
- **Medical model:** This model is child-centered (i.e., the professional focuses on bringing about changes in the child). Families are often not expected to take an active role.
- **Educational model:** The educational model reflects the regulations inherent in P.L. 94-142. Intervention is child-centered, and success often is measured by whether discipline-specific goals are met. Families are expected to be part of the decision-making and training process; the training of family members and the development of home programs are inherent to this model.

No matter which model is used, unless there is collaboration among the team members, the implementation of assistive technology is doomed.

> In the collaborative model, it is assumed that no one person or profession has an adequate knowledge base or sufficient expertise to execute all the functions (assessment, planning, and intervention) associated with providing educational services for students. . . . All team members are involved in planning and monitoring educational goals and procedures, although each team member's responsibility for the implementation of procedures may vary. Team members can be considered as sharing joint ownership and responsibility for intervention objectives. (ASHA, 1991)

Education Module

Now that you have a brief background in assistive technology, you are ready to delve a little deeper into the specific ways it can be used to help young children with severe disabilities. This module provides a discussion of how to assess a child's needs for assistive technology for educational purposes; how to integrate that technology into sensorimotor, preschool, and early elementary curricula; how to measure acquisition of the use of that technology; and how to sell others on the merits of technology.

So read on, and be assured that with appropriate technology and support, all children, even those with severe disabilities, can grow up to be happy, participating members of their communities and society.

Chapter II Using Technology in Educational Settings

No one ever said teaching was going to be easy. Day-to-day curriculum implementation, programmatic decisions, and scheduling issues result in a hectic and demanding work schedule. And now you have to think about computers, switches, touchpads, and talking software! In addition to being responsible for achieving short- and long-term instructional objectives, you are also being asked to incorporate highly technical devices into the learning process. The technological revolution, while offering great promise to the educator, also poses a great challenge.

We are only beginning to understand the impact that technology has on teaching children with severe disabilities. Special devices now available are capable of enhancing the learning, communication, and independent living experiences of children with disabilities. However, we have only a limited number of empirically validated teaching strategies that offer procedures and methods for integrating technology into the educational setting. To complicate the problem, state-of-the-art technology is evolving on a daily basis. As soon as you are comfortable with one microcomputer system or communication device, another one is recommended in its place. Sometimes it seems as though we are on a technological treadmill, always trying to get ahead (or at least stay in the race), never daring to stop investigating the latest technological gadget for fear we will rapidly become outdated. Practical resources are provided in the appendices, including a listing of manufacturers and vendors of assistive devices and a listing of print resources in Appendix B, as well as a description of common types of assistive devices in Appendix C.

This module is designed to help you become more comfortable as you incorporate technology into the educational programs of children with severe disabilities. The module provides a systematic means of identifying which specialized devices will enhance the learning achievement of children across all learning environments (the home, the school, the community). In addition, it offers suggestions and strategies to successfully integrate this technology into the educational process. Please note that throughout the module, references to the "teacher" refer not only to teachers in typical school settings but also to Scout troop leaders, 4-H Club leaders, religious school teachers and, most certainly, family members in the home.

To begin, we first need to define a framework for using assistive technology in educational settings. The general principle underlying the framework is that children have a right to technology to circumvent their disabilities. The corollary to this premise is that using technology will result in definite improvements in the functioning of these children. Current "best practices" in special education suggest that educators in an exemplary program

- employ technology as a tool to facilitate the achievement of educational goals;
- utilize environmentally based assessment procedures to assist in the selection of appropriate assistive equipment;

- select assistive technology based on individual student needs, not on equipment availability;
- integrate assessment procedures as an on-going facet of the educational program to evaluate the effectiveness and fine-tune the use of assistive equipment;
- consider the related skills of environmental control, communication, and mobility in addition to academic achievement when determining educational goals;
- utilize a fluid, multidisciplinary team, whose members change depending on the student's needs, to assess and prescribe technology;
- integrate technology, where appropriate and as needed, across all learning environments of the individual and throughout the calendar year;
- place students in programs based on educational achievement, not disabling condition or need for specialized technological devices; and
- promote interactions with nondisabled peers in a natural environment.

In addition to the best practices listed above, an exemplary program that uses assistive technology should also

- specify in writing the use of assistive technology as a procedure to achieve a learning goal within the Individualized Education Program or the Individualized Family Service Plan;
- explore a range of equipment options—not settle for certain pieces of equipment simply because they are available;
- allow students to use a variety of devices for extended periods of time in real environments before making final recommendations; and
- rely on professionals in the school/agency to assist in integrating adaptive equipment into the classroom. You don't need to become an assistive technology specialist (unless you want to!) to implement technology as part of your curriculum. Although you are the manager of your classroom and you orchestrate the daily activities that occur there, it is appropriate to utilize the services of others to achieve best practice procedures.

Keep in mind the educational philosophy and intervention constructs presented above when reading the remaining chapters. Remember that the field of assistive technology is a new one. Our knowledge of what works and what doesn't continues to evolve as we gain a better understanding of how these tools can be used to facilitate a child's independence and maximize integration. As a professional or a family member who will be involved in the daily integration of technology, your contribution to the field's knowledge base can be invaluable. Approach each potential technology user's educational program with an open yet critical mindset. Don't fall into the trap of applying standard strategies to each case. Be flexible in your approach and creative in your programming. Be willing to try anything—at least once. And most of all, keep a sense of humor.

Chapter III Determining an Individual's Technology Needs

The Environmentally Based Approach

Getting Started

Assistive technology is selected for students in accordance with the primary goal of maximizing their functional independence in all life environments. The procedures for selecting assistive technology described in this chapter represent an environmentally based approach to program development, which takes into consideration all activities and learning situations in which the student participates (e.g., the home, the community, and the school). It may be a lengthy and complex process and requires the participation of all team members and the use of systematic procedures to ensure proper selection of adaptive technology.

This is an important chapter for professionals working with children with severe disabilities for several reasons:

- Educational goals for this population must take into account all living environments within which the individual functions. Research has shown that individuals with severe disabilities must learn and practice skills across all contexts if functional use of skills is to occur.
- The more severe the disability, the more likely it is that the individual will require some form of assistive technology to complete everyday tasks and activities. Since different skills (and therefore different technologies) are needed in different situations, careful study of every living environment is required.
- Assistive technology can be very costly. Therefore, the systematic study of a student's ability to use a particular tool across environments is required prior to purchasing equipment. However, cost alone should not be the deciding factor.

The first part of this chapter will facilitate your understanding of the environmentally based approach to program development. It has been organized around the following questions:

- What is an environmentally based approach to program development?
- Does this approach fit in with my current philosophy of teaching?
- Why should I use this approach to develop educational goals for students with severe disabilities?

The second part of the chapter provides an in-depth description of how to use the environmental approach to select educational goals and to determine what assistive technology is needed by the student to achieve those goals.

Functionality and Independence Across All Life Environments

- What is an environmentally based approach to program development?

Within the last decade, there has been a dramatic shift in the way teachers approach the development of educational programs for children with severe disabilities. No longer is learning viewed as a six-hour experience that occurs within the physical confines of the classroom. Instead, it is seen as a dynamic process that is based on the give-and-take interactions of individuals with the world around them. As a result, the design of educational programs has taken a new focus. Emphasis is placed on developing a student's skills and behaviors required for functional independence and successful integration in all present and future settings.

An environmentally based method of teaching involves the identification of specific skills and tasks that will facilitate improved independence and maximize integration. In this approach, the learning environments of home and community are considered as important to learning as the school situation. The proportion of learning that occurs in the classroom as compared to the learning that occurs in the home and community varies according to the student, the task, and the practicality of moving about in multiple, natural settings.

- Does the environmentally based approach fit in with my current teaching philosophy?

An environmentally based approach to program planning might require some adjustment in the way you approach teaching. The educational philosophy presented herein does not build upon traditional curricula, and the developmental model upon which many early childhood education programs are based is not inherent in this approach. Instead, this teaching philosophy requires the development of a unique curriculum for each child that looks at future goals as well as current learning. However, in spite of their uniqueness, environmentally based approaches are compatible with traditional teaching philosophies. Using this strategy in addition to your existing curriculum will enhance and enrich the learning experiences of each student.

The approach is not new to the field of special education. It is well-grounded in theoretical and empirical literature. It can stand alone as an educational program or it can enhance the traditional curriculum. The environmentally based model of instruction is a "thinking" curriculum in that it relies on the teacher to develop and adjust the educational experiences of each student based on his or her needs in each learning situation. As such, it is particularly applicable to the inclusion of highly specialized devices and techniques.

- Why should I use an environmentally based approach to develop goals for my students?

The goals of the Individualized Education Program for students with disabilities are typically derived from the results of diagnostic evaluations. Information obtained from these traditional assessment procedures, however, rarely helps the teacher decide how to use technology as a tool to achieve educational objectives. There are serious limitations to traditional diagnostic assessment procedures:

- **Norm-referenced tests** provide only a standardized measurement of a person's performance relative to the performance of others.
- **Intelligence scales** only sample and compare behaviors against the norm to determine an intelligence quotient.

Scores and/or ages obtained from the above measures do not provide specific information regarding needs or preferred learning methods of the student or appropriate technological tools for the student to use.

- **Developmental scales** simply compare the student's behavior to sequences of behaviors exhibited by normal children.
- **Criterion-referenced tools** measure target behaviors against preselected behavioral sequences that have been defined according to some predetermined standard.

Through these procedures, skills may be targeted for intervention that may not relate to increased independence or improved functioning.

Use of these tools also presents problems if the student is functioning significantly below chronological age; it may result in the selection of target behaviors and intervention activities that are not in keeping with the child's age or interests.

These assessment tools also assume that certain prerequisite behaviors must be present before more advanced target skills are taught. Some students may never acquire a specific sequence of skills, yet may be able to produce the desired behavior with assistance if the skill is modified or if they are provided with a special aid or device.

An environmentally based assessment can be designed to provide specific information on which technological tools are needed by a student. These assessments:

- **identify sequences of behaviors** that reflect the actual skills necessary to participate within community environments;
- **result in individualized education programs/individualized family service plans** that are relevant to each student's life skills;
- **help delineate low and high technological devices** that could facilitate the ability of a child to achieve functional independence;
- **provide specific educational strategies** on how to integrate technology into the daily living and academic learning activities of the child;
- **eliminate the need to plan for generalization** from isolated tasks to functional contexts and avoid teaching numerous splinter skills; and
- **ensure the development of educational programs that have social validity,** thus targeting the development of skills that are valued by society, viewed as functional, and deemed important for successful integration.

Traditional environmentally based assessments, however, are time-consuming and, although they identify many potential target skills, they do not

- **delineate the order** in which skills should be taught,
- **identify skills needed to make the transition** between activities, or
- **take into account related skills**, such as communication and motor skills.

The assessment procedure described in this module utilizes strategies that address each of these concerns.

Using the Environmental Approach in Assessment

Defining An Ecological Assessment

The successful design of an environmentally based curriculum relies on a comprehensive, well-designed evaluation procedure that assesses an individual's functioning and skill level across all life situations. Referred to as an ecological assessment, this evaluation technique, designed to identify skills that are needed by an individual in a range of contexts, employs tools such as direct observations, surveys, and interviews. Attention is given to all current learning environments as well as those learning environments in which the student will participate in the near future. The goal of the assessment is to delineate the skills needed to participate in traditional activities enjoyed by children without disabilities across a variety of different environments.

Preparing for the Assessment

Preparation for the assessment includes the careful selection of materials, activities, and situations that represent the learning environments within which the child functions.

Step 1: Select materials and tasks that are

- chronologically age appropriate;
- functional and motivating for that student;
- present within the student's environment; and
- adaptable to the sensory, motor, or cognitive skills of the individual.

Step 2: Select environments and activities for assessment that

- incorporate the student's current and future environments;
- represent the student's typical activities; and
- permit ongoing, direct observation of skill performance both during intervention and under maintenance conditions.

Conducting the Assessment

Conducting an ecological assessment enables you to identify specific skills and tasks that will facilitate improved independence and maximize integration. Table 1 illustrates an ecological assessment that was conducted for C. M., a non-speaking

Table 1 - Sample ecological assessment

Name: CM

Date: 10/4/88

Life Environments	Contexts	Activities	Activity Skills	Related Skills	Independence Level*	Modifications
School	Self-contained classroom	Computer time	move to computer		AT	electric wheelchair
			position self at computer		P	aide
			turn computer on/off		P	peer partner
			change disks		P	peer partner
			select programs		I	eye-gaze to indicate choice
			boot software		AT	automatic boot (special programming by computer teacher)
			run program: make choices using computer keys		AT	use headswitch and adaptive firmware card - this allows use of a switch with any software
				request help	AT	use signal to indicate when finished, use eye-gaze board to ask questions
				interact with peers	I/AT	use multicomponent communication system: eye-gaze, facial expression, low-tech aide
				use switch for computer and wheelchair	AT	
				use eye-gaze board	AT	
		Art - reverse mainstreaming	cut and paste		CNO	aide to cut paper prior to activity; head-mounted light pointer to select cut-out pieces, direct where to place pieces, etc.
					AT	use headstick to apply paste
					P	cross-grade peer buddy to mount pieces
			coloring		I	use eye-gaze to select colors
					AT	use headstick with crayon attached to color
				direct actions of partner	AT	use low-tech board
				motor skills to use headstick		
		Independence class/cooking	move to cooking area		AT	electric wheelchair
			label foods and actions		AT	low-tech, topic-specific boards
			direct action sequence of cooking		AT	pre-programmed voice output device and low-tech boards
			perform cooking actions		AT	switch-activated blender, toaster, etc.
			eat food	(same as computer time)	P	aide assists

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* I = Independent; AT=Independent with assistive tools; P=Partial; CNO=Cannot do without modifying task

Table 1 - Sample ecological assessment (cont'd)

Name: CM

Date: 10/4/88

Life Environments	Contexts	Activities	Activity Skills	Related Skills	Independence Level*	Modifications
School	Regular education kindergarten	Circle time	move to circle		AT	electric wheelchair
			sit in circle		P/AT	aide takes child out of chair, child sits in modified seat on floor
			raise hand		AT	loop tape signal to request turn
			answer questions		AT	teacher preprogrammed voice output device for routine questions, head-mounted light pointer to select people and objects in environment, low-tech aids available for needs and interaction messages
			sing songs		AT	switch-activated tape recorder with songs
			return to seat	(same as computer time)	P/AT	aide puts child in wheelchair
		Reading Readiness	move to first grade class		AT	electric wheelchair
			find own desk and position materials		AT/P	electric wheelchair, aide positions materials
			raise hand		AT	call signal activated with switch
			select pictures/ word card		AT	aide puts on pointer, head-mounted light pointer to select card
			complete multiple choice worksheets		AT	crayon on headstick for marking, aide sets up easel and headstick
				ask for help	AT	low-tech board for social and needs communication
				understand directions and readiness concepts	I	
	Cafeteria	Move through line; select food, utensils				
		Move to table		Since this serves only as an example, all segments of this form have not been completed.		
		Eat lunch				
		Discard trash				
	Playground	Move across playground				
		Participate in group games				
		Participate in free play				

Table 1 - Sample ecological assessment (cont'd)

Name: CM

Date: 10/4/88

Life Environments	Contexts	Activities	Activity Skills	Related Skills	Independence Level*	Modifications
School	Hallway	Move to class and cafeteria daily				
		Move to playground daily				
		Move to music one time per week				
	School driveway	Load and unload on bus				
		Line up				
	Nurse's office	Toileting				
		Dress/ undress (coat, boots, etc.)				
		Equipment check		Since this serves only as an example, all segments of this form have not been completed.		
	School office	Turn in attendance and lunch count				
Community	Mall					
	Playground					
	Neighborhood					
	Church					
	Fast food					
Home	TV room					
	Dining room					
	Kitchen					
	Bathroom					
	Bedroom					
	Front porch					
	Backyard					

6–year-old girl with severe cerebral palsy. She had very limited motor control although with proper positioning, head control was functional. Results of testing suggested probable average intelligence although there was some variability in test scores. Assessment of literacy and literacy-related skills suggested abilities at the reading readiness level.

The following steps are typically followed when conducting this assessment.

Step 1: **Divide the student's daily experiences into the three major life environments of**

- home: focuses on skills performed in and around the house;
- school: involves skills related to educational achievement; and
- community: includes how the child is able to get around the community, use stores and services, and participate in or observe recreational activities.

Step 2: **Identify specific contexts within each environment that represent those settings within which the student currently functions or might function in the near future by using one or more of the following:**

- attitude and information surveys to be completed by significant persons in that environment,
- direct observation of the target environment (i.e., setting and types of participants), and
- face-to-face interviews (to determine preferred activities of that age group) of significant persons in the environment and nondisabled peers.

Step 3: **Determine the relevant activities that the student engages in within each learning environment using the procedures outlined in Step 2.**

Step 4: **Identify the specific activity skills that are likely to be performed by the student when engaged in that activity. Generate the list by**

- observing the activity being completed by the student as well as a nondisabled peer,
- referring to developed task analyses or available scope and sequence charts, and
- surveying significant others within the learning context.

Step 5: **Identify critical related skills or behaviors (i.e., communication, motor, literacy, and social) that are needed to maximize the student's participation in the target activity. These ancillary skills enhance the "naturalness" or "functionality" of the student's behaviors both within and across activities. To obtain this detailed information,**

- observe nondisabled peers engaging in each activity (include observations of student's off-task behaviors and transitioning behaviors between activities),
- use goals specified by individual therapies, and
- interview significant others for their priorities.

Step 6: Determine the independence level of the child as he or she performs the various activity-related skills. This will involve comparing the student's performance of an activity to the performance of the same activity by a nondisabled peer. To accomplish this portion of the assessment,

- determine which skills the student is able to perform independently, and
- conduct a discrepancy analysis of the student's performance as compared to the performance of their nondisabled peers by
  - observing the student engage in the activity, and
  - identifying the aspects of skills with which the student has difficulty.

Step 7: Determine whether modifications, such as specific assistive aids or devices, assistance by a peer or significant other, or adaptations made to the specific skill sequence, could enhance the student's ability to engage partially or independently in these skills.

Implementing the Educational Program

Step 1: Prioritize activity and related skills for teaching by considering the following dimensions:

- interests of the student;
- preferences of significant others;
- values of the student's culture and general society;
- student needs for promoting independence;
- practicality of teaching the skill, including issues such as the cost of needed technology, staff time required to teach the skill; and
- potential of the skill to permit full or partial participation.

Step 2: Teach the target behavior to the student using one of the following procedures:

- directly teach the student to perform the target behavior;
- employ an adaptation that the student can use to perform the target behavior, then teach the behavior; or
- teach the student to perform a different but related target behavior.

The environmentally based approach to curriculum development results in a very individualized set of educational goals and objectives. Although the assessment component is time-consuming, the procedure precisely delineates the types of assistive equipment needed for a student to achieve maximum independence and function. Furthermore, once completed, the assessment specifies which skills need to be taught and in which contexts. Another advantage to the ecological assessment process is that it can be built into the daily program routine. The ability to perform a particular skill can be evaluated as the student attempts to use that skill during a naturally occurring activity. Finally, it is virtually impossible to accurately identify all the necessary assistive technology components that are needed by an individual unless this approach is utilized. It is truly well worth the time and effort!

Chapter IV Integrating Technology into the Educational Curriculum

Designing a Technology-Rich Environment

Students with severe disabilities often require the use of specialized equipment throughout the school day. These children use technology not only for learning purposes, but also for communicating with others, taking care of personal hygiene, and participating in recreational activities. Assistive technology is any tool that improves the independent functioning and/or helps to maintain current skill levels for individuals with disabilities. It includes high-tech equipment, such as adapted computers and dedicated communication aids, as well as low-tech aids, such as book holders and picture books.

Extensive use of assistive equipment by several children in one class can result in a very crowded learning environment. In such situations, careful consideration must be given to arranging the environment to promote independent access to devices, learning and social interaction, child safety, and equipment security.

The first step in designing a technology-rich environment is to list the activities, materials, and projects to be used to achieve each child's educational goals.

Step 1: **List all the activities in which the child needs to participate, regardless of availability of materials and technology. These activities should include a range of different learning experiences, such as**

- **Listening and viewing activities.** Music and taped read-aloud stories operated by switch-activated tape recorders and record players, as well as taped stories or books controlled by slide/tape show equipment, are easily acquired assistive tools that provide independence in reading and listening.

  Video "picture books" that encourage the development of tracking, expectations, and visual/sound relations in the child with severe cognitive limitations are available (e.g., Early Images Videotapes produced by Gerry Baby Products Company). A child who also needs to develop motor skills, such as head control, could be fitted with a head-mounted mercury switch attached to the television. The video can be turned on when the child raises his or her head, thus activating the switch.
- **Structured group activities (including group games and instruction).** Individual, topic-specific communication boards, chart- or transparency-based group vocabulary displays, and encoding strategies allow children to participate in a large number of group learning situations. For example, a topic-specific vocabulary display can be prepared for a follow-up discussion of a visit to a farm or the zoo. The vocabulary requirements of structured activities, in particular, can often be predicted, thus permitting the construction of appropriate vocabulary displays for students prior to each activity.

- **Craft and discovery.** Special software used with adapted computers permits children with motor limitations to create high-quality, computer-generated graphics (see Figure 1). The same is true of computer–generated music, and one source of such software is Switch in Time (telephone# (617) 354-6577). These students can also use modified hand-held devices or head sticks to glue, paint, and draw pictures. In addition, children with head-mounted light pointers can direct the actions of able- bodied peers to create art projects.

  Children with motor impairments who are at the sensory-motor stage of development can also engage in exploratory activities using special equipment. Slings or splints can provide arm or hand support that will enable children to engage in water and sand play. Adaptive toy gyms can be used that allow children to engage in different exploratory play schemes, such as batting and hitting.

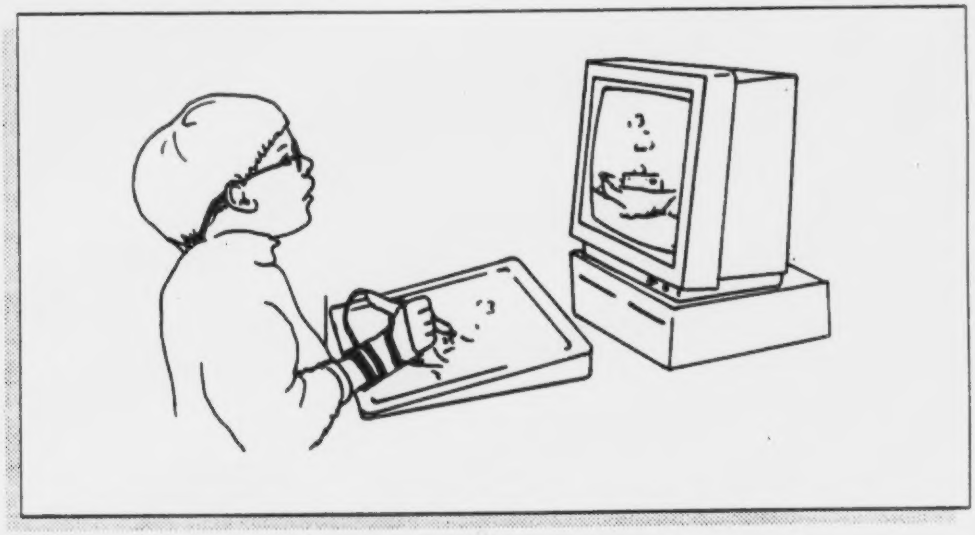
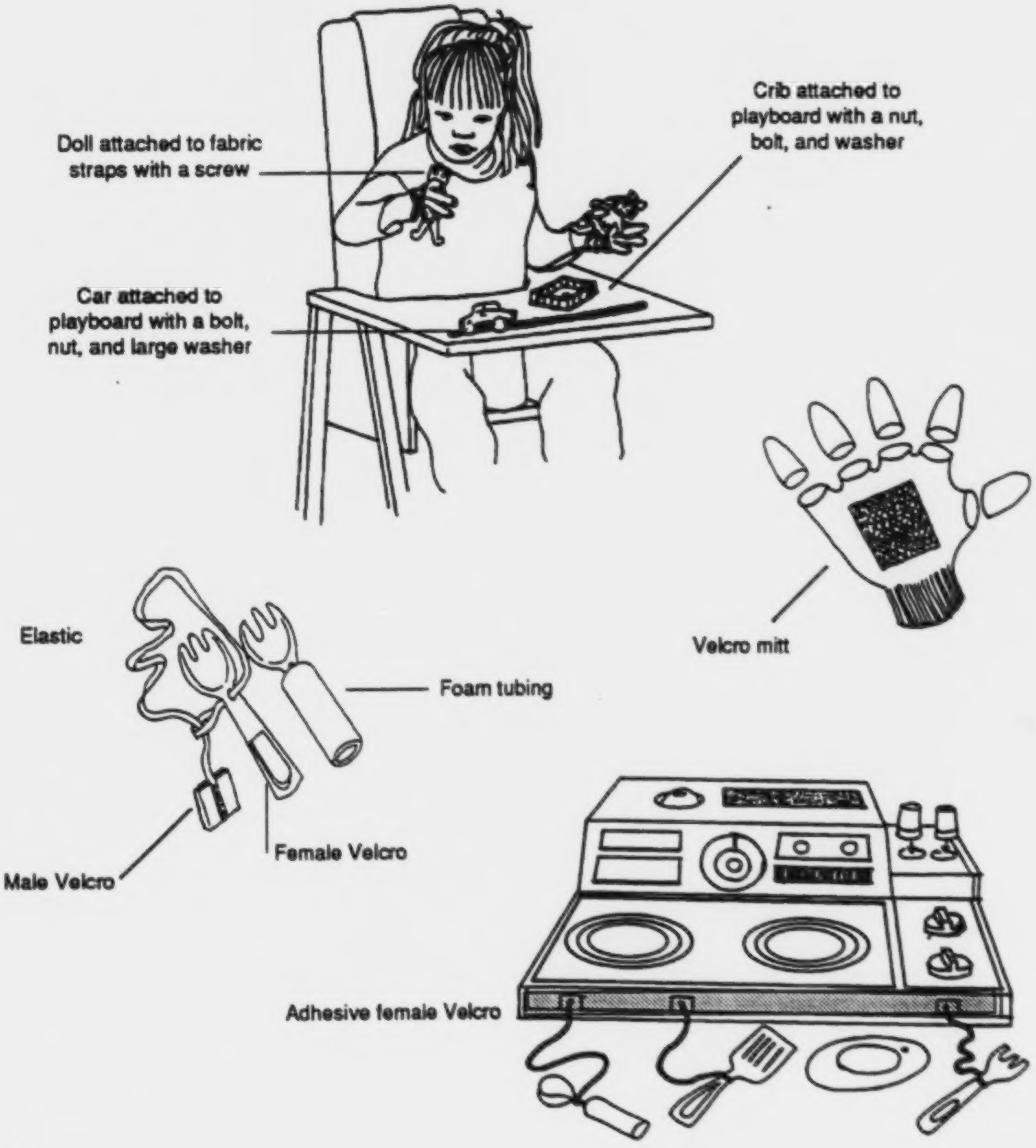


Figure 1 – Computer-generated graphics

- **Symbolic/representational/dramatic play.** Voice output communication aids allow children with severe speech impairments to participate actively in role-playing activities. Their level of interaction is greatly enhanced when the activity can be somewhat scripted, such as in a pretend telephone conversation with grandma. Also, adults, siblings, and peers can stimulate both language and device use by employing the communication aid to talk about the child's ongoing activities. Simple modifications to play materials and props also facilitate the ability of children with motor impairments to use these objects in their play. Such modifications may include handles screwed into Fisher-Price dolls or Velcro attachments to toys (see Figure 2).


Doll attached to fabric straps with a screw
Crib attached to playboard with a nut, bolt, and washer
Car attached to playboard with a bolt, nut, and large washer
Velcro mitt
Elastic
Foam tubing
Male Velcro
Female Velcro
Adhesive female Velcro

Note: The playboard suggestions originated with F. Carlson in *Prattle and Play*, 1982, Omaha: University of Nebraska Medical Center. The suggestions for the adapted kitchen toys are from C. Goossens' and P. Elder in *Augmentative Communication: Implementation Strategies*, 1988, Rockville: ASHA. The Velcro mitt suggestion originated with C. Musselwhite in *Adaptive Play for Special Needs Children*, 1986, San Diego: College Hill Press.

Figure 2 – Adapted toys

- **Computer-assisted/directed instructional activities.** The daily use of adapted technology to facilitate learning is rapidly becoming a standard practice in the education of children with physical disabilities. This is particularly true in self-contained settings where students function at different cognitive levels and academic instruction must truly be individualized. In such settings, students have access to their own microcomputer systems within the classroom. For example, a child at the beginning stages of learning may participate in various cause-and-effect games and visual/auditory sustained attention activities during his or her individual computer time. Another child at the literacy stage of development may use computer time to write in his or her journal or complete a spelling assignment. Some software programs have been carefully designed so that the timing of activities facilitates learning among children with severe disabilities (Cooper, 1991).
- **Motor activities.** Traditional fine motor activities can be enjoyed by children with severe disabilities by providing them with modified toys and games. Big-knob puzzles and blocks with Velcro strips are examples of easily modified toys. Low-tech assistive drawing tools can be used for coloring, drawing, and writing activities for all levels of development. Popular computer games can also be used by simply modifying the timing features via special software. Participation in gross motor games and activities can be facilitated through the modification of game rules and the use of special equipment. For example, a child with a severe speech disorder could direct a game of Simon Says using a voice output communication device. Independent mobility (powered if necessary) allows children independence in the classroom and on the playground. A game of hide-and-seek can be fun for children in wheelchairs as well as their able-bodied peers. A child with gross motor disabilities but appropriate attention and visual skills can learn to drive powered wheelchairs at a developmental age of 15 to 18 months. Children with more severe motor impairments may accomplish this skill at 3 1/2 years of age (see *Positioning, Access, and Mobility Module*).
- **Therapeutic activities.** Most children who use assistive technology throughout their day will also be involved in ancillary therapy services. Consider the range of services and the types of equipment used within each therapy service when considering each student's activity plan.

Step 2: **Arrange the environment to facilitate participation in each activity. To establish individual areas within the classroom for each activity, consider the following steps:**

- Plan the location for each activity.
- Scale the size for each activity area so that it can comfortably accommodate up to four children (and their assistive technology).
- Determine the physical boundaries that distinguish one activity area from another.
- Create these boundaries using dividers, surface height changes, or colors.

  - Be sure that activities that involve using the floor or mats are physically isolated and prevent transit through them—this is particularly important when students are independently mobile.
  - Create a single path through the room from entry to exit that is wide enough to accommodate wheelchairs.

Additional consideration must be given to planning and organizing individual computer stations within the special education classroom. Adapted computers and the use of a variety of assistive tools and devices often require space and secure storage.

- Define the location and space for the computer station(s) so that each station can accommodate at least two students in wheelchairs.
- Visually and auditorily isolate the station from the other learning areas.
- Consider whether the computer table can
  - be height adjusted,
  - be wheelchair accessible, and
  - accommodate expanded keyboards of variable sizes.
- Make sure there are numerous power outlets with surge protectors.

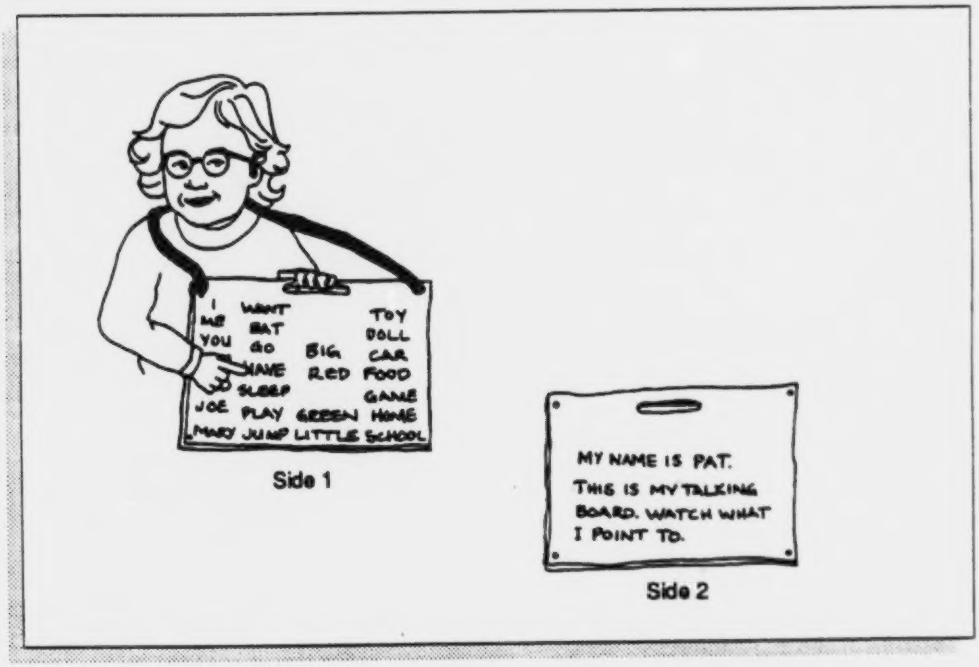
Enhancing Independent Communication

Successful communication interactions can be achieved by students who use augmentative communication if access to specialized strategies and devices is provided in all environments. Children who use unaided communication techniques, such as manual signs and gestures, are not at risk of being without their augmentative mode, since no tools outside of the body are required. Children who use graphic communication symbols, such as pictures or special symbol sets, however, are at a significantly greater disadvantage. Unless their vocabulary displays are readily available, they have no means of using formal symbols to express themselves.

An exemplary educational program ensures student access to vocabulary displays in all environments. In the past, this task has been accomplished by providing a personalized communication board that was available in all situations. While this strategy continues to be very valuable, use of more generic vocabularies, appropriate to a wider range of individuals, has also proven successful. The following section discusses the use of individualized vocabularies, topic-specific communication boards, and group vocabulary displays as a means of providing students access to appropriate language content.

- When devising personalized communication displays (see Figure 3)
  - Compile individual vocabularies for each student based on the results of the ecological assessment.
  - Identify messages for the personalized display that are usable in many situations.

- Always include instructions for the listener that explain how the student communicates. Graphic drawings as well as written instructions are often helpful here.


I
ME
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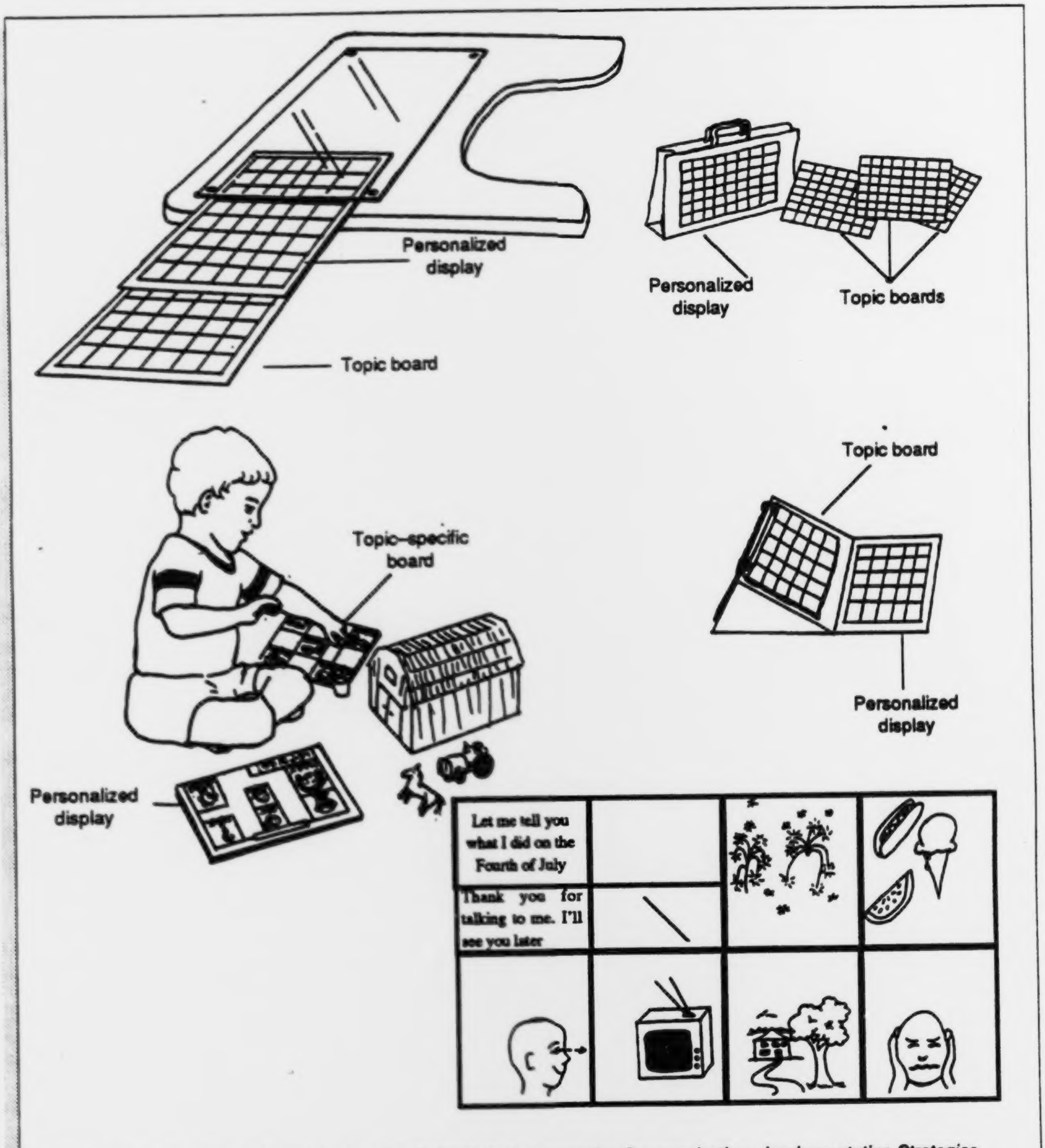
MARY
JUMP
BIG
RED
GREEN
LITTLE
TOY
DOLL
CAR
FOOD
GAME
HOME
SCHOOL
Side 1
MY NAME IS PAT.
THIS IS MY TALKING
BOARD. WATCH WHAT
I POINT TO.
Side 2

Figure 3 – Example of personalized communication display

- When considering topic-specific mini-communication boards (see Figure 4)
  - Use mini-boards to provide individually tailored, 12- to 15-message vocabulary displays to be used for specific activities.
  - Select messages that are topically related for inclusion on a single display.
  - Arrange messages so that the individual has equal access to both their personalized display and each topic board.
  - Consider various formats for organizing the messages, such as:
    - A communication notebook divided into different content areas. Each section contains a vocabulary display specific to a single topic, and the student maintains possession of the notebook throughout the day;
    - Individual, topic-specific boards that are located within the environment. Each topic board is organized as a self-contained vocabulary display. The communication board is placed in the activity area for which it was developed, thus reducing the need for portability as well as the student's responsibility for transporting it; and
    - Vocabulary displays that can be easily transferred between low- and high-tech and between portable and nonportable devices.


Personalized display
Topic board
Personalized display
Topic boards
Topic board
Personalized display
Topic-specific board
Personalized display

Let me tell you what I did on the Fourth of July

Thank you for talking to me. I'll see you later

Note: The 4th of July display originated with S. Cook in *Augmentative Communication: Implementation Strategies*, 1988, Rockville: ASHA.

Figure 4 – Examples of topic-specific communication displays

- When arranging for immediate communication of selective messages
  - Identify messages that represent frequently occurring requests and comments produced by the students throughout the day (e.g., "Good morning, everyone!;" "When is it time for recess?").
  - Place the graphic symbol that will represent each message in easily accessible locations within the target activity area.
  - Consider using a loop tape with each individual message so that the child can "speak" his or her message to the teacher or classmates (see Figure 5). A loop tape is a 10–20 second, continuous playing tape similar to tapes used in answering machines. Any message can be recorded onto it.
  - Use individual call signals to draw attention to the student's desire to communicate when loop tapes are not feasible.
- When considering use of group communication boards (see Figure 6)
  - Develop large-group communication boards for messages that can be used by a variety of students.
  - Consider using these large displays for group activities so that
    - Students can easily view the messages of other students, and
    - Only one vocabulary display is needed as opposed to individual displays for each child.
  - Mount displays on the walls or use easels.
  - Facilitate every student's use of the displays regardless of motoric skill. Children who are able-bodied can model use of the displays while pairing their messages with speech. Children with motor impairments can either
    - Directly select with a part of their body or a light pointer, or
    - Employ scanning with the assistance of a partner (e.g., the partner can ask, "Is it this one?" as he or she points to each symbol).
  - Structure traditional circle time activities so that communication and peer interaction are optimized. For example:
    - Design wall calendars (refer to explanation of Calendar Drawing later in this section) to be used as group communication displays.
    - Incorporate daily schedules into a communication activity. For example, language master cards on a display can be selected by the children and put through a language master to relate the sequence of the day's activities.

For further information about communication displays, see the *Communication Module.*

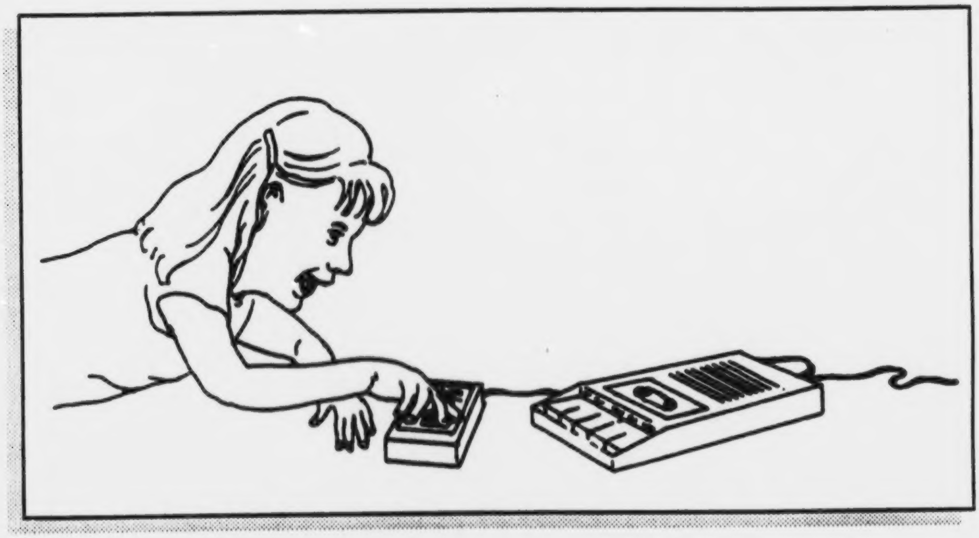


Figure 5 – Loop tape with activation switch

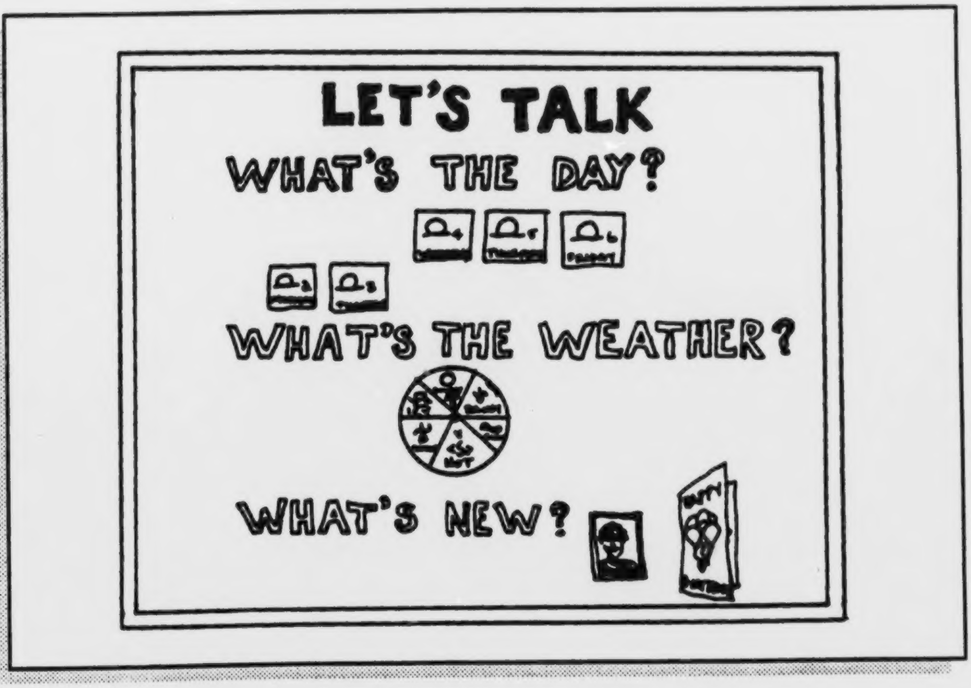

LET'S TALK
WHAT'S THE DAY?
WHAT'S THE WEATHER?
WHAT'S NEW?

Figure 6 – Example of a group communication board

Facilitating Socialization

Designing the Classroom

The physical set-up of the classroom can have a significant impact on the quality of social interaction that is achieved by the child with severe disabilities. Activities and materials can either enhance or suppress the amount of conversational exchanges that occur.

- To produce an environment that is conducive to social interaction among your children:
  - Restrict the physical size of the play or learning area (for those children with significant cognitive or emotional challenges, just being physically close to another child is a necessary learning experience).
  - Limit access to play materials so that children must share in order to complete an activity or project.
  - Provide ready and immediate access to communication displays.
- When choosing activities for students and their peers:
  - Remember that interaction occurs more often in sociodramatic and game activities than in functional or constructive activities.
  - Consider highly structured play activities because they result in the highest level of social interaction regardless of the materials employed. These include activities that
    - limit access to materials,
    - use a single play or activity theme (e.g., a craft), and
    - employ frequent teacher/family member direction.
- To ensure selection of materials and toys that will encourage social interaction:
  - Select toys that are familiar. When toys are new, children tend to play with them independently; attention is focused on the object rather than on interactions that occur with that object.
  - Identify toys that have high social value, including toys that show increased levels of
    - popularity: measured by the number of children playing with that toy,
    - attention: measured by the duration of play with that toy, and
    - social value: measured by the number of children who play with the child holding the particular toy.
  - Remember that the popularity and social value of play materials change with use and as children grow older. What is popular at one age may not be at another. The value of a toy decreases after repeated exposure.
- When attempting to facilitate interaction through the use of computers:
  - Use software that requires keyboard or adapted keyboard input rather than hand controllers (e.g., joysticks). Use of the keyboard requires sharing, while use of hand controllers results in either competition for the controller or loss of interest in the activity.

- Consider drill and practice software that is slightly above the children's independent work level. It encourages use by pairs or small groups of children because they must pool their knowledge to use it successfully.

Establishing Peer-Buddy Programs

Peers, both able-bodied and disabled, are important companions and playmates for children with severe disabilities. With minimal instruction, these students can provide positive social experiences and friendship to children who are often out of the mainstream of life. Experience has shown that careful planning and selection of peers increases the level of success of any peer interaction program. Children as young as five and six years of age, in fact, have been taught to play and communicate successfully with students with severe speech impairments who use very complicated communication devices.

As you might expect, the success of these "peer-buddy" programs can often be attributed to the interest and commitment of nondisabled peers in becoming friends with children with disabilities. Be sure to take ample time when selecting those who will be playmates for the children who use technology. Several factors are important in this selection.

- Consider children whose teachers and family members support peer-buddy relationships and who will excuse students from classes several times a week.
- Identify playmates who are popular with the other children. Children tend to copy the behavior and mimic the interests of popular students. When popular students increase their play with children with disabilities, other peers usually follow.
- Select students who have high rates of attendance and who express an interest in being a peer buddy or friend.
- Avoid children who are active in a large number of extracurricular activities. Despite their interest, these peers often do not have the time or energy to commit to a peer-buddy program over a long period of time.

Once the nondisabled peers have been selected, you can begin the training program. The following organizational points should be considered.

- Match students according to similar sex and interests. Try to pair students who are less than three years apart in age and close in developmental level.
- Schedule several 15- to 20-minute teaching sessions over a week's time. Both the peer and the technology user should be present.
- Provide one to two weeks of direct training of each pair of students. Research has shown that surprisingly short periods of teaching can result in dramatic increases in play interactions.
- After the initial training period, provide "booster" training sessions every other week. The booster sessions serve as additional teaching sessions during which you can monitor the interactional behaviors of the peer groups and provide suggestions for improving their skills.

One successful program that has been used to teach nondisabled students how to communicate and play with children who use technological devices utilizes five components. Each component is introduced during every teaching session. A detailed discussion of these components follows.

Component One – Instructing. The purpose of this component is to provide participating peers with general information regarding the use of technology with individuals with disabilities, the nature of the disability of the target student, and specific instruction in how to use the student's technology. For example:

- Similarities between children with and without disabilities are discussed.
- The technology user, including his or her skill level, personal interests, and activities enjoyed, are described.
- Stereotypical and avoidance behaviors that may be exhibited by the technology user are discussed.
- The technology used by the individual is described and hands-on experience using the communication aid is provided.

Component Two – Modeling. Research has shown that use of a technological tool increases when individuals are shown how to use it. For example, to incorporate the modeling component when teaching a student how to use an augmentative communication device:

- Model specific turn-taking and conversational strategies.
- Demonstrate potential unintelligible behaviors and model various strategies for repairing communication failures. This should include techniques for the technology user as well as techniques for the peer partner.
- Following each modeled behavior, turn to the peer or target child and explicitly describe the modeled behavior.
- Emphasize the importance of playing together throughout the session.
- If needed, model socially inappropriate behaviors that are part of the technology user's repertoire and demonstrate how to deal with them.

Component Three – Role Playing. This phase of teaching allows the peer to practice the use of technology and facilitating strategies in a supportive, nonthreatening atmosphere. Initially, you assume the role of the technology user and allow the participating peer to practice using the interaction strategies with you. You then assume the role of the helping peer so that the target child can practice interaction facilitating strategies. The amount of role play needed will be based on the skill level of the participants.

- Immediately after each role playing phase, allow the peer and technology user to practice the techniques demonstrated.
- Include multiple opportunities for both children to practice these strategies. If needed, provide opportunities for the peer to deal with the modification of inappropriate and avoidance behavior.

Component Four – Integrating. This phase involves the implementation of the program in the natural environment. It might be considered the most important part of the program because it ensures functional use of skills.

The following teaching behaviors have been shown to enhance the communication and interactional skills among children with disabilities and their nondisabled peers:

- observing the peer and the technology user communicating via the augmentative device in the natural environment;
- providing feedback regarding the interaction, pointing out positive instances of interaction as well as missed opportunities;
- prompting interaction between children if it does not occur spontaneously within 10 seconds (e.g., explicitly instructing the peer on what to do, then handing him or her the communication device to be incorporated into the activity);
- prompting the peer facilitator to initiate interaction and respond to the communication attempts of the technology user;
- prompting the child using the device to initiate interaction; and
- using social praise during successful interaction attempts.

The *Communication Module* contains a discussion of teaching functional communication skills that complements the above information.

The following teacher behaviors have been shown to result in increased positive child-child interactions during desktop computer activities:

- prompting the peer to help the technology user,
- deflecting children's requests for help to the peer facilitator, and
- responding to requests for specific help with verbal explanations.

The following teacher behaviors have been found to negatively affect child-child interactions:

- responding to requests for help (seen as loss of control by the child) by demonstrating,
- "quizzing" children on what they are doing as they work at the computer, and
- providing assistance and direction without being requested to do so.

Component Five – Generalizing. This is a necessary and critical aspect of the entire process. Research has shown that skill generalization is often limited in individuals with severe disabilities. This is particularly true in the field of augmentative communication. To promote the expression of social interaction skills by technology users, consider the following:

- Require use of the technology in situations where multiple "non-buddy" peers are present.

- Establish the trained peer as a mentor to the other nondisabled children on how to use the specific technology with the target student.
- Teach the peer facilitator to
  - include the technology user in existing activities as opposed to unique activities,
  - encourage participation in regular play groups rather than in play with the technology user separately,
  - assist the technology user in learning how to perform skills required by the activity, and
  - modify rules of the game without sacrificing its integrity.
- Teach peer facilitators strategies that they can use with other peers. Techniques used by peers to increase interaction between their peer group and children using technology include
  - demonstrating to the untrained peer how to initiate interaction with the technology user,
  - reinforcing the necessity for untrained peers to interact with the technology user, and
  - verbally prompting untrained peers to interact with the child using technology.

In addition to the five-component program described above, validated peer strategies that facilitate interaction among children who use desktop computers include

- giving the other student verbal instructions,
- demonstrating for the other student (when solicited),
- helping the other student (e.g., showing what to do next; asking what color they want, etc.),
- asking each other for help, and
- providing demonstrations with explanations for the other student.

Using Personal Aides

Using adult personal aides to assist children with severe motor impairments has been the mainstay for numerous integration programs. Without the presence of these individuals, who act as scribes, manage materials and equipment, and assist with personal care, many children would not be able to participate in the least restrictive environments.

The implementation of these programs, however, has not been without its problems, primarily because we simply have not had enough experience with successful personal aide programs to know what works and what does not. In many instances, our quest for successful mainstreaming has lead us to provide too much assistance, in academic as well as nonacademic tasks. The result has been an over-dependence by the child on the aide to assist in the completion of activities that the student has the potential to do independently. Too often, the personal aide assumes the role of individual tutor for the child on a full-time basis. At first glance, this may seem like a good idea, but the short- and long-range effects can be disastrous. Unless they are very astute and carefully monitor their behavior, the aides often have a tendency to complete at least some of the child's work themselves. This tendency grows out of good intentions and a desire for the child to succeed. Another problem related to adult aides is that their presence can have a negative impact on a child's socialization with peers, particularly during the adolescent years.

In spite of these difficulties, the use of personal aides in the classroom should continue because of the invaluable assistance that they provide. To assist you in implementing a personal aide program, the following can be used as a preliminary guide:

- Provide explicit training to the personal aide using the same components described previously in the peer training program. Model the attributes of a quality aide and provide numerous role-play scenarios in which to practice these support skills.
- Monitor the performance of the personal aide on a regular basis. It is much easier to an individual observing an activity to identify situations in which there is "too much support" provided.
- Introduce the personal aide as a classroom aide without emphasizing that this person is assigned to the student with disabilities. Altering the role of the aide provides a more normalized experience for the child and helps lessen his or her dependence.
- Use classroom or cross-grade peers to act as scribes as often as possible. Use carbon paper or photocopy notes. Peers often provide more appropriate levels of support than adults. The peer could change every period, thus making the time commitment of each peer reasonable. Use of peers as personal aides facilitates improved socialization skills and the development of friendships.
- Schedule independent work time for the child once a week at a minimum. This time period should be devoted to the independent completion of assignments and writing activities. While the personal aide may assist the child in setting up for the activity, the execution of the task is the sole responsibility of the child. This strategy requires the availability of appropriate assistive technology and adaptive equipment.

Promoting Sensorimotor Development

Assistive technologies can be helpful tools for achieving childrens' curriculum goals. Three curriculums are discussed in this module. Using assistive technologies within the sensorimotor curriculum follows. Chapter VI presents the integration of assistive technology into the preschool curriculum and into the early elementary school curriculum.

There are many elementary school-age children with severe disabilities who function within the sensorimotor period of development, which is generally thought to cover the period of infancy, specifically between birth and 2 years of age. Educational programs designed to facilitate acquisition of skills within this period are currently very popular in this country. In fact, developmental curricula are typically based on this theory of development.

Developmentally based classrooms today contain multiple examples of assistive technology. Adapted, battery-operated toys and switch-modified appliances, such as small fans and tape recorders, are common in classrooms. In fact, integration of assistive technology into the classroom may have proven most successful for children who are functioning within this sensorimotor period of development. As a result, much information has already been written about the use of adapted toys and appliances to achieve specific sensorimotor goals (e.g., Burkhart, 1980, and Goossens' & Crain, 1986). Therefore, instead of focusing on how to use assistive technology as part of a developmental curriculum, this section provides specific examples of how adapted tools and devices can effectively be used to assist children in the acquisition of sensorimotor skills. The examples provided are by no means comprehensive; they were selected primarily to highlight the possible uses of technology throughout each stage of sensorimotor development.

Please note that this discussion of the use of assistive technology in relation to a developmental teaching model is in no way an abandonment of the ecological model of assessment and the environmental approach to program development upon which this module is based. The use of the latter intervention framework is still recommended, regardless of the child's level of functioning. We do not see the two models as incompatible; rather, we believe that the developmental model can be subsumed under the environmental model. For example, when determining which activities must be accomplished by a child within each environmental context (as is done in an ecological assessment), one of the most frequently identified activities is play (often defined as "active exploration of and interaction with one's environment"). Since acquisition of sensorimotor skills depends on exploration of and interaction with the environment, a child must be able to engage in the task of "play" in order to learn. Therefore, educational goals at this level are typically designed so that children can develop the specific component skills needed for successful play. Initially, simple exploration of the environment is encouraged, with a gradual move to functional play activities. Eventually, and as children near the end of the sensorimotor stage, beginning representational play emerges.

Facilitating Acquisition of Sensorimotor Milestones

Educational goals based on developmental models are frequently organized around Piaget's developmental framework. In this model, development is conceived as a series of sequentially ordered skills that represent several branches of development. The following examples illustrate how to use adaptive technology to enable children to achieve milestones within each of these target skill areas.

Develop visual pursuit and an understanding of object permanence: This skill involves the concept of an object as an independent entity in the environment. It begins with the simple act of looking. As the child develops, he or she gradually engages in visual tracking of objects; later, visual pursuit of objects occurs at a faster and faster rate and through wider and wider arcs. Eventually, the child is able to visually follow objects despite the fact that they may temporarily disappear. Examples of educational objectives aimed at facilitating acquisition of this skill and related adaptive tools include:

Goal: Follow a slowly moving object through a 180-degree arc.

Adapted Technology: head-mounted mercury switch and switch-activated toy that uses linear movement (e.g., musical choo-choo; fireman's ladder).

Procedure:

- Position the toy at eye level to the child.
- Place the switch on the child's head.
- Prompt the child, using physical cues as needed, to raise his or her head to watch the toy.

Effect: The switch activates the toy only after the child raises his or her head. For the toy to work, the child's head must be elevated. The toy continues to work only as the child's head moves to follow it.

Goal: Recognize the existence of an object despite its temporary disappearance behind a screen.

Adapted Technology: switch and adapted toy that moves in a predictable direction.

Procedure:

- Cover a portion of the path of the toy with a large opaque screen.
- Present toy and switch to the child.
- Prompt the child to activate the switch and observe the toy in action.

Effect: As the child learns that the object still exists despite its disappearance, he or she continues to activate the switch to make the toy reappear.

Goal: Find an object hidden behind a series of successive screens.

Adapted Technology: head-mounted light pointer (see Figure 7).

Procedure:

- Cover portions of the path of an interesting toy with several opaque screens.
- Slide the toy behind different screens.
- Randomly leave the toy behind one screen and ask, "What happened to _____?"
- Encourage the child to use the light pointer to identify where the toy is hidden.

Effect: Repeated exposure to this activity allows the child with severe physical disabilities to engage in exploratory activities that lead to an understanding of object permanence.

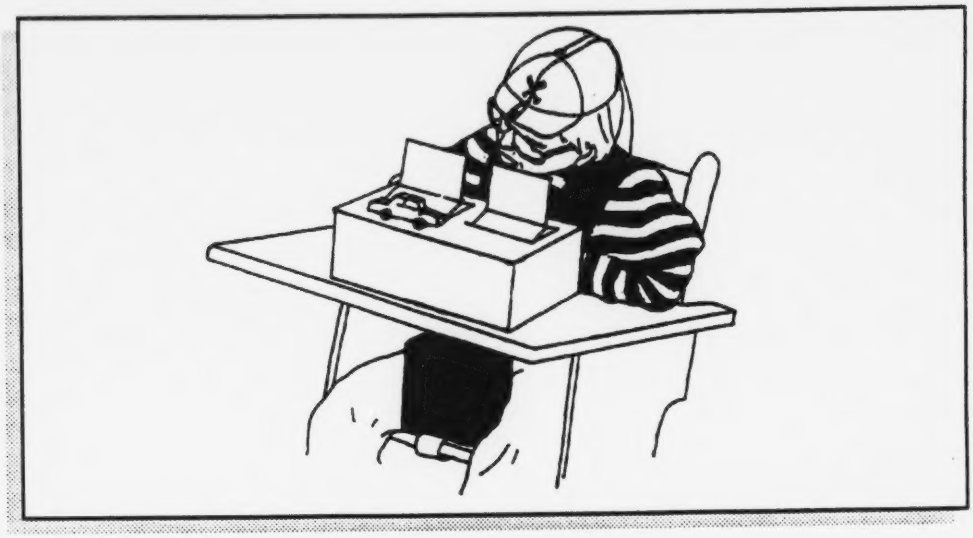


Figure 7 – Head-mounted light pointer

Produce desired environmental events: Observations of this skill focus on determining how infants obtain preferred objects and events in their environment. In this instance, trial-and-error behavior, which is used to repeat the occurrence of a preferred activity/event, eventually becomes appropriate and intentional. Beginning differentiation of means/ends behavior is implied by the immediate repetition of behaviors which accidentally produced an interesting result.

Greater differentiation of means and ends understanding is observed by singling out a particular action as a means for achieving multiple end results.

Goal: **Employ one intentional behavior to activate several interesting spectacles in the environment.**

Adapted Technology: a single switch and several adapted toys or appliances.

Procedure:

- Provide multiple experiences of activating toys using the same switch.

Effect: Through repeated exposure, the child learns that the switch is the means by which the toys are operated. Acquisition of this knowledge occurs when the child immediately and intentionally activates the switch while watching the toy.

Goal: **Perceptually recognize obstacles that interfere with achieving a particular end result.**

Adapted Technology: light pointer.

Procedure:

- Select toys, such as stacking rings or shape sorters.
- Modify each toy so that one of the rings is solid or one of the shapes is too large for the container.
- Encourage the child to use the light pointer to select rings/blocks to complete the activity.

Effect: Through multiple exposures to such situations, the child begins to realize that certain toy pieces cannot be used (e.g., neither the solid ring nor the large block fits). This represents developing attention to the perceptual characteristics of objects and that the properties of objects affect how they can be used.

Develop imitative behavior for both vocal and gestural purposes: Infants begin by imitating simple gestures that are well within their repertoire. Later on, they begin to imitate more complex actions. They gradually progress to imitating unfamiliar gestures that they can see themselves perform and, later, those that they cannot see.

Goal: **Make the same gesture upon seeing a familiar gesture.**

Adapted Technology: direct selection digitized voice output aid which may or may not be switch modified.

Procedure:

- Program the aid with cheerful sounds, such as animal noises or vehicle horns.
- Position the device in easy view of the child.
- Position the switch (if used) within the child's visual range.
- Use a game format to elicit imitation of activation of individual messages using the display.

Effect: Allowing the child to watch himself or herself activate the switch establishes rapid understanding of the purpose of the switch. Children with severe motor impairments often are asked to activate switches that are not within their visual field. Difficulty in achieving reliable switch use may be a result of the child not being able to understand the relationship between the switch (cause) and the toy (effect).

Goal: **Imitate invisible gestures.**

Adapted Technology: two head-mounted switches and adapted toys.

Procedure:

- Model for the child how to activate a head-mounted switch.
- Encourage the child to imitate the behavior using physical prompts as necessary.
- Use the switch activated toys as reinforcement.

Effect: The ability to imitate visible gestures emerges before the ability to imitate invisible ones. Assisting the child in achieving the latter objective may facilitate his or her skill in using switches that may need to be placed outside of his or her range of view because of the motoric patterns of the child.

Develop operational causality: This skill is related to the active anticipation of events and the use of procedures to elicit occurrence of events. Initially, children employ their own procedures to recreate events. As they develop, they recognize that adults can also be used to achieve desired outcomes.

Goal: **Demonstrate that cessation of an interesting spectacle evokes a procedure.**

Adapted Technology: switch; timer module for appliances; television.

Procedure:

- Plug the television into the timer module; connect the switch to the module; set the timer to allow the television to play for 45 to 60 seconds before shutting off.
- Position the child in front of the television. Select a program that provides high levels of auditory and visual stimulation.
- Provide a switch to turn the television set on.

Effect: The child learns that he or she has the power to control the television via the switch. Use of a timer provides numerous opportunities to practice the behavior.

Goal: **Use an adult to achieve a desired outcome.**

Adapted Technology: switch; switch-activated tape recorder adapted for use as a loop tape device.

Procedure:

- Record a message on the loop tape that requires the help of an adult to accomplish a task (e.g., a message that says "more music" to ask the adult to restart an audio tape, or "rock, please" to request continued rocking of the child).
- Position the switch so that it is easily accessible to the child.
- Engage in the desired activity for 30 to 45 seconds, then pause
- Wait for the child to activate the loop tape with the request message before continuing the activity.
- Provide physical prompts as needed.

Effect: By using the loop tapes, the child learns that he or she is able to achieve control over the environment by directing the behavior of the adult communication partner.

Construct object relations in space: The child must learn to recognize that objects differ in their position in space.

Goal: Alternate glances between two visual targets.

Adapted Technology: light-activated pointer.

Procedure:

- Begin by presenting the child with two interesting visual targets spaced somewhat apart.
- Place a light-activated pointer on the child's head.
- Draw attention to each target as you might if you were engaged in a picture book routine.
- Alternate the targets throughout the activity.

Effect: An increase in the child's visual scanning can be achieved using this type of activity. By mounting the lightpointer so that it mirrors the direction of the child's eye gaze, the light can be used to highlight the objects that attract the interest of the child. Continual changing of the targets (which occurs when one turns the pages in a book) enhances the interest level of the child.

Develop schemes for relating to objects: This skill deals with the way children interact with objects or, more simply, the way they play with toys.

Goal: Shaking and examining objects.

Adapted Technology: Velcro hand mitt; traditional toys modified using Velcro.

Procedure:

- Construct hand mitts for the child that incorporate Velcro pieces in the palm.
- Glue Velcro strips to a variety of traditional toys.
- Present a range of toys to the child during play.

Effect: The simple addition of Velcro to standard toys and the use of specially developed hand mitts allows children with variable hand control to grasp and maintain their hold on toys.

Goal: Selectively apply schemes depending on the properties of the object.

Adapted Technology: toy gym.

Procedure:

- Modify commercially available toy gyms so that the toys can be used interchangeably.
- Present up to three toys at a time that can be used in different ways.
- Allow the child to play with each toy depending on his or her interest.

Effect: By presenting toys and objects in a way that allows the child to easily explore their uses, he or she can learn the appropriate function and use of each. With such modifications, children with physical limitations can also learn how objects act upon one another.

Facilitating Understanding and Anticipation of Routine Events

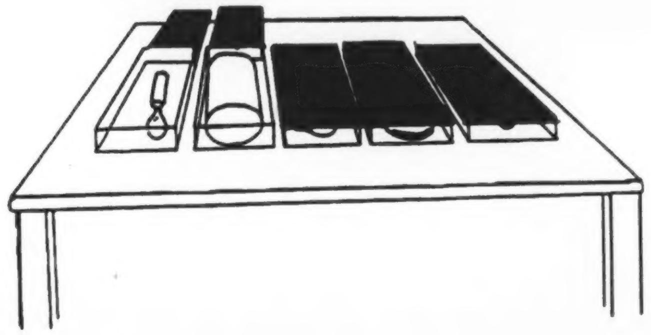
Many children with severe disabilities are most receptive to learning, understand language better, and behave more appropriately when their school days are organized and structured for them. Those of you who have worked with these students are well aware of how simple changes in daily routines disrupt the general behavioral state of these children. As a result, many master clinicians and theorists teach children to identify and eventually to predict the day's routines and activities. Two procedures that have proven very successful are described below.

Activity Sequence Boxes

One of the most effective procedures for developing understanding of daily routines is through the use of Activity Sequence Boxes (ASBs) (see Figure 8). Very simply, this strategy involves the use of a sequenced presentation of objects used to convey a daily sequence of events. This idea is not new to education. In fact, it has long been used to facilitate learning of daily schedules and activities in individuals with dual sensory impairments (Sternberg, Battle, & Hill, 1980). Adopted recently for use with children with severe cognitive impairments, this procedure is also referred to as the use of anticipation shelves and calendar boxes.

The format of the activity sequence boxes is simple. A series of boxes (e.g., clear plastic shoe boxes) and carefully selected objects are used to represent each activity.

- Clear an area in the classroom that can accommodate a linear presentation of materials. If the ASBs differ among students, it is best that each set be strategically located in different parts of the classroom.
- Arrange the boxes in a linear fashion on the table. Remove the lids and place them immediately behind each box. Eventually, each box will contain an object that will function to remind the student of a daily school activity.
- Identify a salient object within each daily activity. Select objects based on frequency of use during the activity or their attractiveness to the child. If the size of objects within the activity is prohibitive, consider selecting a part of the object to use. For example, if you want to represent the activity of "playing on the playground," you can use several links of chain from a swing to represent the activity since the play equipment is so large. It is better to use part of the actual object (e.g., chain links) rather than a miniature representation of that object (e.g., a toy swing from a Fisher Price set).
- Place one object in each box in the order that mirrors the schedule of activities for each day.
- A variation of this procedure uses a shelf with dividers. Instead of boxes, objects are placed within a compartment, with each compartment representing a different activity. At the end of the shelf is a box labeled the "all done box" into which the objects are placed following completion of each activity.



Note: Box 1 with a spoon means snack, and Box 2 with a bolster means PT/exercise. The covered boxes contain toilet paper which means bathroom, a headset, which means music, and chain links, which mean playground.

Figure 8 – Example of Activity Sequence Boxes

Several sequential steps are involved in the implementation of this strategy, including:

- Establish the child's association between objects within an activity and the activity itself. An association has developed when the student engages in functional use of those objects independent of the activity. For example, when the child sees a cup, he or she pretends to drink.
- Set up the ASBs near the activity. Prior to the event, take the child to the ASBs and allow him or her to carry the appropriate object to an activity.
- Allow the student to use the object appropriately throughout the activity.
- Return the object to the ASBs after completing the activity and close the lid of its respective box.
- Repeat the procedure with different objects and their boxes representing different activities.
- Gradually provide different examples of the object used to represent the activity (e.g., use different cups to represent mealtime). Change objects only after the connection between the object and activity has been firmly established. Changing objects in this manner ensures generalization of the association between the object and the activity beyond a single example.

- Repeat the procedure until representations for each activity have been developed.
- Select a permanent place for the ASBs within the classroom.
- Enable student to make choices.

Calendar Drawing

Another interesting variation of the ASBs has been described by Writer (1987). In this strategy, drawings representing various activities are used the way objects were used in the ASBs. One drawing is developed to represent each activity of the school day. Prior to each event, the child and teacher go to the calendar, look at the picture, and proceed to the activity. After the activity is completed, they return to the calendar to identify the next event. A common variation of this strategy uses Polaroid snapshots or magazine pictures to depict each activity.

The use of Calendar Drawings (CDs) as an assistive tool probably requires somewhat higher cognitive skills than the ASBs. The specific procedure is presented below.

- Begin using CDs after the child demonstrates consistent and reliable use of the ASBs.
- Facilitate transition from objects to line drawings using the following steps:

Step 1:

- Retrieve the object representing the target activity.
- Trace around the object and color the tracing.
- Draw attention to the similarities between the object and the drawing.
- Take the drawing and the object to the activity.
- Complete the activity and return the object to the box.

Step 2:

- Retrieve the object representing the target activity.
- Draw the object as you look at it.
- Continue the procedure as described above.

Step 3:

- Look at the object on the shelf.
- Draw the object from memory.
- Continue the procedure as described above.
- Replace the ASBs with the calendar of drawings as the child becomes familiar with the procedure.

- Gradually change the drawings to standard two-dimensional pictures of the objects; change one characteristic at a time, including
  - eliminating color,
  - scaling down the size, and
  - introducing black-and-white line drawings from a commercial picture series.

Developing Beginning Communication and Social Interaction Skills

The establishment of beginning communication and social interaction skills is discussed in depth in the *Communication Module*. It is important, however, to mention the critical importance of facilitating these skills in children functioning within this sensorimotor period of development. Many times, the primary goal of the programs in which these children are involved is the development of beginning communication and social interaction skills. For these children, primary importance is placed on the development of:

Reciprocal interactions: The development of this skill involves facilitating beginning turn-taking behavior in children. Adapted tools, such as light pointers, allow the child to select partners for play; commercially available software allows participation in songs; headsticks adapted for use with crayons and paintbrushes encourage reciprocal play with peers.

Signaling behavior: This skill relates to establishing a means by which the child can call attention to himself or herself. The simple provision of a call bell or a loop tape message saying, "I need you. Please come over!" can meet this need.

Communicative pointing: The emergence of this behavior often signals the beginning of intentional behavior in children without disabilities. A head-mounted laser beam can allow a child with even the most severe physical challenges to "point to" toys and objects across the room. This may be the child's first chance to request toys, people, or snacks that are not close. Other behaviors that emerge in this gestural complex include showing off and the showing and giving of toys. Adapted tools, such as the mitt with a Velcro palm (discussed previously), can be used to allow expression of these same behaviors by children with severe physical disabilities.

Interest and participation in book routines: We now understand the importance of early reading and picture book activities to the development of literacy and literacy-related skills. Using books with cardboard-type pages or simple modifications (e.g., large tabs made from popsicle sticks to facilitate page turning, or styrofoam packing pieces to separate the pages) permit children with limited motor skills to engage in exploratory book behavior independently (see Figure 9). Other modifications that utilize communication symbols allow children to "tell" the story along with their communication partner. Finally, the placement of story books on slides and videotape encourage children to engage in book activities whenever they wish.

Choice-making: Clinical experience has shown that children with severe physical disabilities quickly learn passivity and helplessness. One strategy for facilitating active participation in communication exchanges as well as daily routines is to provide opportunities for making choices about games, snacks, toys, or playmates. ASBs (discussed earlier) offer a format for presenting choices that is easy to manage.

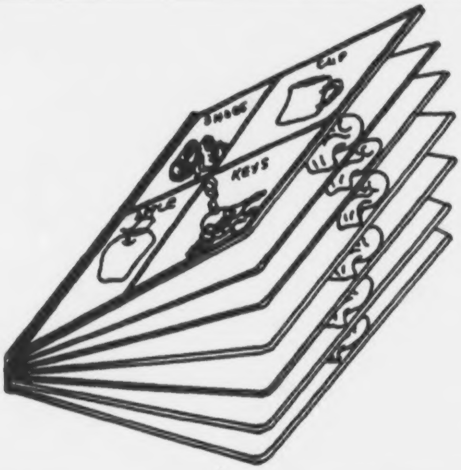


Figure 9 – Modified book

Chapter V Understanding Computers

Much of the assistive technology being used today in the educational programs for children with severe disabilities involves computer hardware and software. We understand that some readers may have extensive knowledge of the field of computer technology, while some may not. This section, which is not meant to be exhaustive, is merely designed to provide the reader with an overview of computer components that may be encountered through an assistive technology program.

Setting up a computer laboratory and/or computer station within an individual classroom is a feasible strategy for providing access to technology in the regular education setting. Consider the following steps when instituting a computer program for your mainstreamed students:

Step 1: Decide which computer system will meet needs of your students.

There are two options to consider when selecting a computer system: a stand-alone or a network system.

- Stand-alone computer systems are your best bet when just beginning a computer program. A stand-alone system consists of a single central processing unit (CPU) and related hardware, such as the keyboard, monitor, disk drive, and printer.

  The advantages of stand-alone computers include
  - Greater number from which to choose,
  - Less cost than networked systems,
  - Greater variety in courseware computers,
  - Easily moved from location to location, and
  - Easily adapted for individuals with disabilities.
- Network systems are not frequently seen in school settings, although local area networks are slowly gaining favor. A local area network (LAN) has individual microcomputers that are physically linked together through a master unit or central source. In this situation, the maximum number of microcomputers within a given distance are interconnected. The greatest disadvantage of network systems is that much of the existing courseware is incompatible with them. This fact alone often precludes their use in education.

  The advantages of local area networks include
  - Relatively inexpensive, floppy-type network hardware,
  - No need for back-up disks because each teacher downloads the software program through the master unit,
  - Access to programs for students that is both quick and easy, and
  - The ability to unobtrusively monitor each student's progress.

Step 2: Determine hardware needs.

Hardware required for a desktop system (which differs from a laptop computer or portable word processor) might include

- **Microcomputers with adequate memory.** You will want computers with at least 640K memory to run most software; 1 megabyte of memory or more may be needed if some of the special spoken and written augmentative communication software is used.
- **Two disk drives.** Having two drives eliminates the need to continually switch disks back and forth. This is a critical feature for children with physical limitations. One disk can hold the software program while the second disk can be used for individual student work files. Disk drives are available in two sizes. A drive that accommodates 5 1/4" flexible floppy disks is usable with most educational software. A 3 1/2" inch drive uses smaller floppy disks that are encased in a hard plastic shell.
- **Hard disk drive.** A hard disk can be invaluable to the student with even mild motor problems. A hard disk holds the software programs internally, thus eliminating the need to insert and remove disks.
- **Color monitor.** Invest in a color monitor; the interest and appeal to the student makes it a worthwhile investment. Be aware, however, that the color monitor is expensive.
- **Color printer.** Many programs allow the student to select or create a picture to go with their writing sample. If you use graphics programs, you will also want students to be able to hang their artwork in school or take it home. Like the color monitor, this too is expensive.
- **Speech synthesizer.** Used with speech software, this is a good investment for a number of reasons. Many popular preschool and early childhood programs use voice or music output (check the software requirements to be sure you purchase the right one); you will also find that for some children, learning can be enhanced if auditory feedback is provided; and last, you can simulate a dedicated communication aid by using special augmentative communication software. Be aware that the voice quality often sounds robot-like. The few high-quality synthesizers may be relatively costly.
- **Speech digitizer.** This device offers the highest quality of artificial speech and is typically much more expensive than other devices. With a digitizer, human speech is actually recorded via a microphone onto a computer chip. A fair amount of computer disk space is required to store even a small number of messages.

When a portable system is used, additional considerations include

- **Back-lit screen.** The screen of a portable computer can be difficult to read under natural lighting conditions. A back-lit screen uses a light behind the screen, thus increasing visibility.

- **Portable battery pack.** If a portable writing tool is considered, be sure to check the life of the battery unit. Standard operating time for most portable computers ranges from one to seven hours.

Step 3: Select Special Assistive Tools Hardware and Software

When using computers with children who have special needs, special hardware and software is often needed. Hardware can be as simple as a special keyguard that facilitates keyboard access or as complex as special computer cards inserted into the computer that enable switches or other keyboard simulators to be used. (For a detailed discussion of switch selection procedures, see the *Positioning, Access, and Mobility Module.*) Standard software can be operated on special equipment by any student regardless of physical disability. However, there is a range of highly sophisticated, dedicated software that can be used to develop specific access skills, enhance word processing capabilities, and augment spoken communication. The following types of adapted microcomputer equipment and related peripherals are frequently recommended for use by preschool/elementary-age children with physical disabilities. (Recognize that there is an even greater range of special software for individuals with more advanced academic skills.) For detailed descriptions of the most up-to-date assistive technology available, access ABLEDATA (see Appendix A). This databank can also be accessed through most state resource centers.

Adapted computers and assistive peripherals include

- **Keyguards***:* a flat board with cut-out holes that is positioned over the keyboard. It allows the student to activate a specific key without accidentally pressing adjacent keys.
- **Key repeat eliminators:** a special tool used to eliminate the automatic key repetitions that occur when you continuously press a key. This greatly assists students with motor difficulties by reducing unwanted key activations.
- **Keylatches***:* a special tool that enables individuals with limited motor control to activate multiple keys simultaneously. The student can lock down individual keys, such as the *shift* or *control*, and then press the other required keys.
- **Disk drive assists***:* a small device attached to the disk drive that reduces the amount of motor control needed to insert disks into the drives.
- **Alternative keyboards***:* large, flat boards that can be custom designed to the needs of the user when the standard keyboard cannot be used. For example, on large keyboards, individual key sizes can be increased. The arrangement of the keyboard can be changed on either large or small boards. Miniature keyboards are also available for students with minimal hand movement.
- **Switches***:* an assistive tool to facilitate a student's access to special as well as standard software programs. Varieties of switches have been developed that can be used with all parts of the body, ranging from the foot to the eyebrow.
- **Magnification lenses***:* lightweight, external lenses attached to the monitor to enlarge the screen text. Text can be enlarged up to twice the size of standard print.

Special software programs include:

- **Key assist and repeat key eliminator***:* facilitates use of the standard keyboard by reducing accidental key activation and permitting multiple key activations when needed.
- **Abbreviation and expansion***:* enhances speed of writing by employing a series of codes that, when entered into the computer, automatically expand to a complete message. Abbreviations can be used for words or entire paragraphs. For example, a student types in his initials, *JA*, and the computer expands the message to *Jonathan Applegate*.
- **Word prediction***:* enhances writing speed by predicting what a student wants to express based on the words already entered. For example, the student types in *Hi, how* and the computer asks if the rest of the message is *are you*? Students have the option of accepting this completion or finishing the message with words of their own choosing.
- **Macros***:* (similar to abbreviation and expansion) allows for storage of frequently used phrases, paragraphs, and formats that can be retrieved with a few keystrokes.
- **Motor training***:* uses various game formats to develop consistent and reliable switch- activation skills.
- **Scanning training***:* teaches various types of scanning. Depending on the program, motor skill and/or cognitive understanding of the task is taught.
- **Augmentative communication simulation***:* permits creation of individualized voice output communication displays. Depending on the software, the size and number of messages can be varied.
- **Large print software***:* uses enlarged, easy-to-read letters helpful to individuals with visual impairments. Special utility programs can also be used to enlarge the letters of standard software.
- **Large print processors***:* (used with a joystick) allows the student to enlarge portions of text on the screen. The student highlights the desired portion of the text by moving the joystick. The section then appears enlarged on a second monitor.

Step 4: Decide if certain students need portable writing tools.

As students assume increasing responsibility and independence for written assignments, the use of portable individual writing aids should be considered. Generally, these devices fall into two categories: laptop computers and portable word processors.

A laptop computer is small and portable, generally weighing between three and eight pounds. As small as a three-ringed notebook, it contains the keyboard, disk drive, and monitor in a single unit. Some of the advantages of laptop computers are as follows:

- They are lightweight.

- Entering text via the keyboard is extremely quiet and does not disrupt the classroom.
- Standard software programs as well as word processing can be used.
- A spell–checker and thesaurus are available (as they are with conventional desktop computers).
- They have the potential for large memory capacity.
- Special speed and efficiency software are available to increase the rate and ease with which written tasks are completed.
- Some can be used for spoken communication.
- They can be used with quiet, portable printers.

Portable word processors are designed more like large typewriters with screens. They are essentially computers that do not require software; the word processing capability is built into the unit, which can be used with a standard printer. The advantages of a portable word processor include:

- They are less expensive.
- It is easier to learn the basic operations (as compared to a laptop computer).
- A spell checker is often available.

Step 5: Identify software resources.

- Examine independent software review sources, such as:
  - *Apple Computer Resources in Special Education Rehabilitation*
    DLM/Teaching Resources, Inc.
    Park Allen, TX 75002
    1-800-527-4747
    Resource guide to software and hardware for professionals in special education.
  - *EPIE (Educational Products Information Exchange)*
    PO Box 869
    Water Mill, NY 11976
    516-283-4922
    Independently evaluates and rates education software.
  - *Microsoft, Inc.*
    16011 NE 36th Way
    PO Box 97017
    Redmond, WA 98073-9717
    1-800-426-9400
- Contact commercially available software companies for catalogues. A list of popular publishers/vendors of early childhood and special education software can be found in Appendix D. In addition, check professional journals and magazines (see list in Appendix A) for currently funded projects in the area of microcomputers. Put your name on their mailing lists. A great deal of unique

software can be purchased through these projects at very reasonable prices.

- Investigate additional software sources, such as:
  - *Technology for Language and Learning*
    Special Education Public Domain Project
    PO Box 327
    E. Rockaway, NY 11518
    516-625-4550
    (Public Domain Software)
  - *MECC (Minnesota Educational Computing Corporation) software*
    3490 Lexington Avenue, N.
    St. Paul, MN 55126
    1-800-228-3504
- Attend equipment exhibits and demonstrations at conferences sponsored by professional associations. (See Appendix A for a listing of professional associations.) This will keep you up-to-date on the latest product releases.

Step 6: Design computer set-up plan.

After selecting the type of computer systems you will be using, design a computer set-up plan for an individual classroom that will

- provide one computer per 10 children;
- arrange individual work stations at each computer;
- allow enough space to accommodate two students at each station;
- isolate the stations from the rest of the class visually (and auditorily), if possible; and
- utilize a mobile cart with adjustable height table and locking wheels.

A set-up plan for a schoolwide computer laboratory could

- provide enough computers so that the ratio of students to computers is 2:1 for each class,
- arrange for children to work in dyads (pairs), and
- use partitions to isolate computer work areas.

As described in Part 4, careful organization of your classroom will greatly ease the task of accommodating various pieces of equipment. Optimal arrangement of devices will also enhance their use and will encourage communication and social interaction.

Step 7: Develop a management plan for computer use.

- Provide students with access to equipment a minimum of 15 minutes per day at least three times per week, or for one full day each week.
- Consider ability grouping for software use.
- Arrange for both group and individual computer activities.

- Print out student performance data for recordkeeping purposes.
- Plan for individual time on computers for follow-up activities.
- Provide individual disks and work folders for each student.
- Display computer work on bulletin boards.

As you determine the computer needs that will best suit the students in your classroom, it is important to remember that the field of general and assistive technology is continually evolving. New and innovative developments in equipment continue to improve the speed and efficiency with which students learn, communicate, and complete educational activities and assignments. It is essential that all of us involved in the education of children with severe disabilities keep current on new technology if we are going to serve the best interests of these children.

Chapter VI Using Computers with Preschool Children

As a nation, we have embraced the concept of education in the least restrictive environment (LRE). For many children with severe disabilities, however, the philosophy of integration and mainstreaming has not translated into educational practice. There are many reasons for this, including a lack of knowledge of appropriate instructional strategies, limited personnel, and fragmented services.

Assistive technology (and its related services) offers one alternative for children with severe disabilities to compete in the educational system alongside their peers. Computers, in particular, provide a level of independence and potential for achievement not previously recognized. For some children, assistive technology is the means by which they can be maintained within the mainstream environment. For children with severe cognitive limitations, computers and related technology offer a way to play, engage in peer interactions, and explore the environment.

As educators, we recognize the value of microcomputers in facilitating and complementing the learning and creativity of young children. However, technology cannot replace the hands-on experiences with manipulatives and the creative play experiences provided within early childhood special education programs. With this in mind, teachers need to determine the role that technology will play in their classrooms. The degree to which microcomputers are employed as educational tools ultimately depends on the needs and characteristics of each child/student. A child who has a limited ability to function independently in a least restrictive environment probably requires integration of technology across all life environments, whereas a student who requires assistance only with writing and drawing can utilize assistive devices mostly during paper-and-pencil tasks.

Recently, a wealth of information regarding typically developing children's interest in and ability to use stand-alone computer systems has become available. Teachers of children with severe disabilities can incorporate these findings into program plans in a number of ways. First, information about the changing nature of nondisabled students' interest in and ability to use computers as they grow older can help shape appropriate expectations regarding computer use according to the developmental level of the students. In addition, normative data can be used to assist in the development of educational goals and the formation of task analyses and teaching procedures. Lastly, these observations can provide a better understanding of how personality and learning style affect computer use.

Certainly, computers are not the only technology for children with disabilities; other technologies have been discussed earlier in this module. They are, however, very popular and versatile. For this reason, special time is taken to explore in depth how children interface with them.

This chapter introduces the use of computers with preschool and school-age children. In the first section, research information about preschoolers' interactions with microcomputers is reviewed. This is followed by a discussion of the use of computers to facilitate the acquisition of literacy by elementary-age children.

Principles Underlying the Use of Technology with Preschoolers

- Depending on the type and purpose of a technological device, assistive tools can be introduced to young children with very limited abilities. Simple environmental control units, such as switch-operated mobiles, can be employed as early as a few months of age. Special augmentative communication devices and techniques can be introduced before a child possesses linguistic knowledge to facilitate language acquisition and to provide exposure to communication via nonspoken channels.
- Independent use of computers with discovery-based software begins to emerge around 3 years of age. Children functioning at this level are interested in and exhibit some facility with the independent operation of desk-top computers and the manipulation of software; however, teacher monitoring and input is required on an ongoing basis.
- A preschooler's interest in using computers varies from little to extensive.
- Introducing a computer into the preschool special education classroom does not interfere with participation in free-play activities. Initially, the novelty of a computer tends to decrease their participation in traditional activities, but participation returns to original levels after several weeks.
- The amount of social interaction experienced does not change markedly after a computer is introduced into the classroom. Preschoolers tend to prefer using computers with peers or in the presence of their teacher.

Behavioral Characteristics of Typically Developing Preschoolers During Computer Interactions

Social and Interaction Skills

- Four-year-old children who are interested in working on the computer are as sociable and interactive as those who are not.
- Verbal interaction focuses around turn-taking.
- Children seem to work in pairs.
- Children teach each other to use the computer:
  - they assist one another in keyboard manipulations, and
  - they demonstrate how to "boot up" software.
- When popular children, particularly preschool boys, express interest in the computer, it seems to affect the other children's level of interest.

Personality and Behavioral Characteristics

- Children differ in their initial comfort level with the computer. For example, some are reticent to touch it while others are too rough with it.

- The level of interest in working on the computer varies:
  - The typical length of time spent on the computer is 10 to 20 minutes.
  - Girls who are 4 and 5 years old use computers more and for longer periods than boys of that age.
  - Boys who are 3 and 4 years old take more turns and spend more time on the computer than 5-year-old boys.
  - Boys prefer to work on the computer with friends more often than girls do.
- When asked what they enjoy most about the computer, children indicate they like the control they have over it.
- Independence in working on the computer increases over time because:
  - Initially, the presence of a teacher tends to increase children's interaction with the computer.
  - Over time, adult facilitation of computer use decreases.

Cognitive Characteristics and Representational Skills

- Children demonstrate general knowledge about the computer and its functions after using the computer for several weeks. For example, the children can
  - state its name,
  - verbalize what to do with it (e.g., play, type, make pictures), and
  - recognize the difference in function between the computer and television.
- Children with high levels of computer use appear to be strong in the area of spatial organization. For example, these children
  - play with one toy at a time in an ordered fashion, and
  - engage in play experiences that deal more with organizing and sequencing activities than with fantasy.
- Children with low interest in computers tend to engage in more concrete play episodes rather than in elaborate fantasies.

Comprehension of Screen Graphics

- Most preschoolers recognize that the characters on the screen cannot hear them. They assume this is because of the physical barrier of the screen, although they do not necessarily recognize that the characters are not real.
- Most children realize that to make the screen characters perform, keys must be pressed.
- Many children realize that the computer is responsible for the appearance of the characters on the screen; however, this is not consistently recognized by all children. For example, in the *Stickybears Opposites* program, a number of children think the characters appear from the trees or the woods.
- Most preschool children don't realize how the characters get onto the screen:
  - Some think that characters crawl in the back or that they live in the disks.

  - Some do not understand what happens to the characters when they are not on the screen.

Behavioral Changes Resulting from Interaction with the Computer

When first exposed to the computer, children press one or two keys to see what happens on the screen.

- Gradually, children realize that it is their actions that are causing the changes on the screen.
  - When this happens, they begin pressing several keys at a time, referred to as "piano-playing" the keyboard.
  - Children perceive that the more keys they punch, the more changes there will be on the screen.
- As children learn to watch the screen, they begin to realize that specific keys are related to specific graphics:
  - When this recognition occurs, the child deliberately presses specific keys to change the graphics.
  - Not all preschoolers understand the relationship between key activation and screen changes.
- Children who learn to push keys deliberately to manipulate software are generally bright and approximately 4 1/2 years of age. They can
  - change discs frequently,
  - choose a program from a three-choice picture menu, and
  - anticipate what will happen on the screen.

Computer Goals for Preschoolers

- Under teacher supervision, the typical 3-year-old child can be expected to perform the following:
  - Push a single key after two sessions.
  - Turn the computer and monitor on/off after three sessions.
  - Load disks after one month. However, many still need to be reminded to be gentle with disks.
- The typical 4-year-old child can be expected to perform the following tasks:
  - Turn the computer on and off.
  - Remove and replace diskettes.
  - Follow instructions from picture menus.
  - Change disks (up to three times in 10 minutes).
  - Work with peers (e.g., take turns, share the computer, work cooperatively, talk about their computer activities).

At this point, you should have a working knowledge of the preschool child's interest in and ability to use a stand-alone computer system. To summarize, you should know that:

- Exposure to and benefit from technological devices (e.g., switch-operated mobiles, augmentative communication devices) can occur as early as infancy.
- 3-year-olds can learn to push single keys, load disks, and turn the computer on and off.
- At 4 years of age, children can learn to follow instructions from picture menus and work with their peers on computer activities.
- What children enjoy most is the control they have over the computer.

Realistically, you can expect varied levels of interest in computer activities. You need not be concerned that the computer will *replace* other activities or that it will impede social interactions among peers, teachers, and family members. In fact, in could very well enhance these interactions. From this information about young, typically developing children and their interest in and ability to use computers, we are able to develop more appropriate expectations regarding the skills of special education students in using computer-enhanced learning.

Let's turn our attention now to the types and characteristics of software currently being used with the preschool child.

What We Know About Preschool Software

Types of Software for Preschool Children

- **Discovery-based software**, which is highly recommended for use with preschool children, is designed to place the child in control of what happens on the screen. Scenes are open-ended so that the child can create screen events rather than simply react to closed-ended situations.

  Graphics programs are an excellent example of discovery-based software. Children create colorful screen designs, pictures, and even stories using the keyboard. Examples of well-received graphics programs for preschoolers include

  - *The Bald-Headed Chicken* (Heath, 1987),
  - *Color Me* (Mindscape, 1987),
  - *Magic Crayon* (Clark, 1983), and
  - *What Makes A Dinosaur Sore?* (Heath, 1987).

  SwitchEnsemble by Switch in Time (101 Clay Street, Cambridge, MA 02140, [617] 354-6577) is software for the Apple IIGS that allows students with a wide range of motor capabilities to have successful musical experiences.

  Game software is also frequently employed with preschool children and can be used to develop specific skills related to the operation of assistive devices. For example, a number of special education programs are available that provide practice in switch operation and teach scanning skills. Examples of commonly used game software appropriate for use with preschoolers with severe motor disabilities include the following programs by Don Johnston Developmental Equipment (PO Box 639, 1000 N. Rand Road, Bldg. 115, Wauconda, IL 60084):

- *Join the Circus,*
- *Make It Happen,*
- *Make It in Time,*
- *Make It Scan,*
- *Motor Training Games,* and
- *Rabbit Scanner.*

- **Drill-and-practice and tutorial software,** the largest categories of software in the marketplace, should be used sparingly and in short doses in the preschool classroom. Although they may be effective in teaching isolated skills, the teaching does not occur as a part of the child's daily life, and for some children, generalization of the concepts and the applications of them in real-life situations may be difficult. Examples of targeted preschool skills include
  - color and shape recognition,
  - rhyming, and
  - beginning sound-letter correspondence.

  Some of the more highly rated drill-and-practice/tutorial software for this age group include
  - *Picture Book Fun: Dinosaurs,* and
  - *Stickybear Numbers* (Scholastic Software).
- **Communication and interaction software** allow teachers to simulate dedicated voice output augmentative communication aids using desk-top computers. Many are designed so that the teacher or clinician can individualize the vocabulary for each student. Examples of commonly used simulation augmentative communication programs include
  - *Peale Exploratory Play* (Don Johnston Developmental Equipment),
  - *Talking Power Pad* (Don Johnston Developmental Equipment),
  - *Talking Touch Window* (Don Johnston Developmental Equipment),
  - *TouchCom* (Don Johnston Developmental Equipment), and
  - *Start Talking* (Unicorn Engineering).

See Appendix E for a list of software developed for use with preschool children.

Characteristics of Software Enjoyed by Preschool Children

- Characteristics of early-childhood software enjoyed by children include
  - animation (e.g., stars, bears, guns, butterflies, farm animals),
  - color (with negative reaction to black-and-white programs),
  - music,

  - pushing keys (particularly when pressing any key on the keyboard gets a response),
  - changing screen images,
  - unpredictable events (i.e., children like to be surprised), and
  - size of screen (e.g., small versus big).
- 3-year-old children particularly enjoy
  - being able to press any key to get a response, and
  - programs that require only one motor stroke.
- 5-year-old children prefer
  - programs requiring two motor responses, and
  - software that uses the entire keyboard.

Effective Software for Preschool Children

Software for preschool children should

- promote active learning:
  - Software should require child's active participation in the learning process.
  - Choice-making should be built into the software.
- employ high resolution graphics and animation:
  - Characters should be recognizable figures that are presented on uncluttered screens.
  - The major figure should be centrally located on the screen.
- use songs familiar to preschool children:
  - Traditional rhythms with slow speech should be employed.
  - Children should be able to sing along.
- be appropriate to the preschool level:
  - It should not require reading skills.
  - No more than two concepts should be involved in operating the program.
- load and exit quickly, because preschoolers find it hard to wait.

Principles for Evaluating Discovery-Based Software

According to Haugland and Shade (1988), computer software that reflects a developmental approach to learning should

- incorporate concepts that are appropriate to the cognitive age of the child;
- promote active learning rather than passive participation:
  - Child interacts with the computer.

  - Child initiates and decides sequence of events.
  - Child sets pace of learning.
  - Child can terminate the program at any point.
- give spoken directions that are simple and clear;
- organize and present program content so that it is appropriate for several different developmental levels;
- present learning in a logical and sequential order:
  - Skills are presented in a developmental sequence.
  - One concept must be mastered before another is presented.
- permit independent manipulation of the software without adult supervision after the child's initial exposure;
- encourage interest in the process of learning as opposed to the product:
  - Learning occurs through the process of discovery.
  - Multiple responses are allowed to facilitate learning.
  - Learning through drill-and-practice is minimized.
- employ reinforcement that is motivating and fast-paced whereby
  - reinforcement is immediate,
  - consequences for wrong answers are not more elaborate than the consequences for correct answers, and
  - reinforcement is contingent;
- provide realistic and concrete representations of the child's world;
- incorporate technical sophistication in its creation:
  - high resolution, colorful graphics and animation;
  - clear, uncluttered screen;
  - clear sound quality;
  - quality speech synthesizer; and
  - ease of manipulation;
- promote problem-solving and hypothesis-testing;
- result in visible changes on the screen each time the child interacts with the computer;
- delineate learning objectives clearly and precisely:
  - Software manual should assist the teacher in integrating the software into existing learning skills.
  - Learning outcomes for each activity should be specified.
- specify how to use the software in vocabulary that is easily understood by the child.

Using the Computer As a Teaching Tool

Preschool children, in particular, require a concrete experiential base for the learning of symbolic and representational concepts. The use of concrete construction activities involving physical exploration and play facilitates and maximizes the child's understanding of the world and should precede or accompany concepts presented on the computer.

Computer-assisted learning can complement the preschool child's school program when it is integrated naturally into the educational curriculum. In particular, it provides a stimulating and challenging avenue for developing the individual's understanding of increasingly abstract symbols.

Planning the Activity

Using the information from the ecological assessment discussed previously:

- Select the learning context and specific activity to be introduced.
- Determine which activity skills are required for each child to successfully engage in the activity.
- Identify the related skills needed for successful participation.

Implementing the Activity

- Employ representational play and concrete construction activities to introduce the concepts into the lesson.
- Allow each child to participate in the activity to the greatest extent possible. Use partial participation or assistive tools to facilitate inclusion of children with physical disabilities.
- Recreate the activity on the computer using appropriate software. Pair children with a peer and allow each dyad to independently complete the program.

Facilitating Computer Access for the Able-Bodied Preschooler

- Place the monitor and keyboard on the floor.
- Separate both, using commercially available extension cables.
- Highlight those keys needed to operate the program with stick-on labels, color coding, etc.
- Mask unused portions of the keyboard using cut-out overlays.

Facilitating Computer Access for Students with Motor Disabilities

- Add special keyguards that isolate individual keys, thus promoting their activation.
- Attach teacher-made paddles to the standard keyboard to facilitate activation of individual keys (Burkhart, 1987).
- Provide disk guides to assist disk insertion.

- Employ various expanded keyboards and related software (as recommended through the multidisciplinary evaluation) with children who cannot access a standard keyboard.
- Utilize the computer with switches or special keyboards to provide access to standard software for individuals with limited motor control. (For an explanation of needed computer applications, see Appendix C, Common Types of Assistive Devices.)

The goal of this section of the chapter was to develop your understanding of how computers could be effectively integrated into the teaching curriculum of preschool children. In addition, information about software features that preschoolers find appealing in software can assist us in the selection of appropriate software based on the needs and interests of our students.

Using the Computer to Achieve Functional Literacy

Within the last 10 years, research has found that the acquisition of literacy begins long before children are taught to recognize letters and print their names. Literacy awareness has its beginnings in looking at picture books, scribbling with crayons, and learning the logos of favorite fast-food places.

Most individuals learn about reading and writing as they engage in the typical play experiences of childhood. They acquire functional literacy through systematic instruction and by independently practicing a range of skills. For children with severe disabilities, however, special strategies are needed for such learning to occur. In many instances, the acquisition of literacy is greatly facilitated by the use of adapted computers and peripheral devices. For some students, technology may be the only means to acquire such skills.

Computers and other special devices are critical to reading and writing instruction for children with severe disabilities, as illustrated below:

- Children with severe cognitive disabilities need repeated presentation of information with multiple examples before learning can occur. Their need for exposure to concepts is greater than that required by other students, and microcomputers can provide the necessary additional learning experiences.
- Some students require a multisensory approach to learning. The materials and lesson preparation time required by this approach may not be reasonable in certain classroom situations. In these cases, the computer can be used to help provide multisensory learning experiences.
- Some children with severe disabilities have limited interactions with the community. In some cases, the computer can be used to simulate these learning situations. Computer software depicting trips to the farm, seashore, various stores, or changes in weather can help them get some idea of what it feels like to be in these situations.

- Certain types of disabilities, such as sensory impairments, may limit the use of standard teaching materials. Special computer adaptations (e.g., large print for children with visual impairments and the use of written words below visual displays for children with hearing impairments) may allow students to access these materials.
- Limited motor skills may preclude handwriting activities. However, almost all paper and pencil tasks can be simulated using the computer.
- Motor impairments can potentially limit a child's participation in art class. However, drawing and coloring activities can also be completed easily using assistive tools and specially designed software.
- Educational goals for students within the same classroom are often vastly different, thus making program planning a very difficult task. Individualized learning plans can be developed and carried out with ease using the computer as the learning and teaching tool.
- At times, professionals may be unfamiliar with validated programming strategies for students with low-incidence disabling conditions. In these instances, special hardware peripherals and software programs can be used that provide the student with a set of appropriately sequenced learning activities.

From these examples, you can easily see how valuable computer technology is for the student with disabilities. One question you may be asking, however, is "How computer literate should a student in an early childhood special education program be?" Generally, it is felt that these children can

- engage in computer-assisted instruction, such as drill-and-practice or tutorials;
- be exposed to problem-solving activities like those found in simulation software; and
- learn how to use certain computer applications, such as word processing.

The following sections focus on the use of the computer to support the development of reading and writing.

Using Computers to Facilitate the Acquisition of Reading

The use of computers to assist in the learning process is referred to as computer-assisted instruction (CAI). Depending on the courseware selected, CAI can reinforce skills, introduce new ones, or simulate experiences from real life. CAI software typically falls into four categories: drill-and-practice, tutorials, simulations and games.

Drill-and-Practice CAI

- employs repetition and practice of previously learned skills;
- presents material that facilitates automatic responding;
- includes instructions that are easily understood by the student;

- requires a simple motor response;
- provides immediate feedback regarding accuracy of the student's response;
- uses feedback that is not distracting to the learning process (i.e., feedback for wrong answers are not more exciting than that given for correct responses);
- focuses on content, such as color recognition, shape names, beginning reading readiness skills and simple quantitative math skills;
- increases the student's attention to tasks;
- results in the learning of material at a faster rate than traditional methods;
- should be used only on a limited basis over a period of time; and
- serves an important function in special education because it provides repeated exposure to the material.

Tutorial CAI

- is instructional in nature;
- introduces new skills in a step-by-step fashion;
- can also be used to reinforce learning that has been first introduced by the teacher;
- can analyze patterns of responses so that errors in learning can be overcome through additional presentation of material;
- lends itself well to the teaching of basic concepts and relational vocabulary;
- requires active manipulation of the software for the student to progress through the program (i.e., no more than three or four screens of information should be provided before the student is required to make a response);
- must provide for a range of alternative exercises for students who need additional exposure to certain concepts;
- requires careful supervision of the student to ensure that information is learned correctly; and
- is difficult to develop because of the need to include sufficient, yet varied, examples of the target skill.

Simulation CAI

- provides practice in problem-solving and critical thinking;
- models real-life situations in which the child must develop solutions to different problems;
- allows students to participate in and make decisions about real-life scenarios;
- typically requires functional reading skills and more abstract cognitive skills; and
- is probably not used much in the primary grades.

CAI Games

- provide an enjoyable context for the presentation of drills, tutorial information, or simulation learning experiences;
- have clearly defined learning objectives (which distinguish them from arcade games);
- require mastery of game content to win;
- should not be so competitive that winning overshadows the instructional purpose; and
- can be used to practice previously learned material or to provide instruction in new information.

Exploratory software

- gives student control of what happens on the computer screen;
- accepts all keystrokes as correct; there are no right or wrong answers;
- uses principles of discovery and motivation; and
- is very interesting for preschoolers.

Historically, drill-and-practice and game software have been the types used most extensively with children who have disabilities. The use of well- constructed tutorial software, however, is increasing. With this tool, teachers can develop the literacy skills of capable students who, until the infusion of technology into the classroom, had no way of independently engaging in reading and writing tasks. Simulation software continues to be used infrequently because of the level of critical thinking required. Some useful applications do exist, however. For example, children can learn about money, making change, and purchasing goods with "playing store" simulation software.

As you can see, each of these four types of computer-assisted instruction have a place in the early-childhood, special education environment. The degree to which each one is emphasized depends on the cognitive skills and reading abilities of each student. While initial computer applications focus on helping children "learn to read," applications at the end of the continuum emphasize "reading to learn."

It is important to stress that the utility of computer-assisted instruction is dependent upon the availability of effective software. Effectiveness is measured by how well the courseware meets the individual education goals of the student as well as by its technical soundness. The degree to which courseware meets the instructional needs of the student is frequently referred to as "learner-centeredness." Software that is learner-centered features instructional prompts and individualized pacing, uses reinforcement, and checks for understanding. It also employs meaningful contexts and develops intrinsic motivation. Keep the principle of "learner centeredness" in mind when considering the use of computer-assisted instruction with your students.

Using Computers to Facilitate the Acquisition of Writing

Functional literacy includes not only the ability to read, but also the ability to write. Many regular school curricula, in fact, are beginning to introduce written language skills as early as kindergarten.

Unfortunately, the development of written language skills in children with severe disabilities is frequently neglected. In some cases, this lack of educational focus has been pragmatic; students simply did not have the motor skills to efficiently produce legible handwriting. Generally, however, families and teachers have simply given low priority to the development of writing skills.

Assistive technology can now be used to help facilitate and provide independence in the task of writing. Adapted hardware and software can reduce the number of keystrokes needed to type a word or phrase, provide auditory and/or visual feedback about the written sample, and even facilitate the construction of sentences. Equally important is the fact that children who previously had extreme difficulty producing attractive and legible documents can now take pride in their written accomplishments.

In the section below, word processing and the enhancement of written language through the use of technology are discussed. Recognize that much of what is known about computers and writing is based on studies of elementary-age children. Some modifications and adjustments will be required if applications are to be made to younger children.

What is Word Processing?

Word processing is a type of tool software that facilitates the writing, revising, and editing of documents on a computer. Tool software is content-free; it simply provides the framework for writing. The individual provides the content.

The following discussion examines the benefits of using word processing with children who have special needs. Prerequisites for using word processing for written language instruction and suggested activities are provided. Information on what to look for when selecting word processing software is provided, and several of the more common programs used with this age group are reviewed.

Benefits of Word Processing

The use of the computer as a tool for written communication has resulted in positive skill development for regular as well as special education students. Some of the positive effects noted include

- improved attitude about self as a writer and the task of writing;
- increased willingness to write and less apprehension about making errors;
- improved ease and speed of putting ideas on paper (i.e., students are able to write down their ideas quickly and legibly);

- more focus on the content of the composition as opposed to the mechanics of writing (i.e., there is less concern with making errors because of the ease in correcting them);
- more positive feelings about writing activities (the final product is always an attractive document, free of scratch-overs and erasures, which is a new and positive experience for many youngsters with learning or motor problems);
- increased independence in the classroom for children with severe motor limitations (these children can now efficiently complete written class assignments and homework without the help of scribes);
- creation of longer written documents (because the task of writing is easier, the children have greater motivation to write more);
- improved quality of writing that includes a larger vocabulary, use of punctuation, and use of more complex writing structures;
- increased use of revising strategies (i.e., modifying words and changing sentence order is an easily accomplished act and therefore occurs more often), which increases the quality of the final product; and
- ability to document improvement is increased because permanent records of writing activities can be kept on disk.

Enhanced Learning Through Computer Use

Observations of beginning readers' interactions with word processing programs suggest that the multisensory feedback provided by the computer is often invaluable to the child with special needs. Some research suggests that different modalities may be more important for learning at different points in the process (Rosegrant, 1985) The visual modality becomes increasingly important as literacy develops. Although considerable variation exists among individual students, the general pattern of modality use is as follows:

- *tactile:* interest in activating the keyboard with little attention to the spoken output or what happens on the monitor;
- *tactile with auditory:* interest in speech output that occurs by keyboard activation;
- *tactile, auditory, visual:* brief interest in printed output, but little attention to the monitor;
- *tactile, auditory, visual:* attempts are made to read the monitor screen; and
- *tactile, auditory, visual:* interest in what appears on the monitor screen and on the printed page, with interest in reading other students' work as well.

Although we must be cautious when applying this behavioral sequence to the development of intervention strategies for individuals with severe disabilities, this information may be useful as we select the hardware to use for word processing training. Based on this information, we may want to consider

- introducing exploratory experiences with the input device the student will be using. Allow the child to interact with the alternative keyboard or switch input in a play activity before using it as part of a structured activity.
- using software that employs a speech synthesizer. Speech output not only increases interest in the use of the computer but facilitates learning as well. Some feel that individuals with profound impairments learn faster when synthesized (as opposed to natural voice) input is provided.
- providing print output of the student's text. As interest in writing increases, children enjoy rereading and sharing their compositions.
- investigating the effects of writing software that includes graphics. Early studies indicate that children's interest in the monitor is a later-emerging behavior. Perhaps this is because the monitor displayed only black-and-white print. A variety of writing programs are now available that allow the student to illustrate their writing samples with brightly colored pictures. Perhaps a more interesting computer screen will result in increased attention to the monitor.

Prerequisites to Using Word Processing

Procedural Prerequisites:

- access to a computer at least three times per week for 10 to 15 minutes, and
- teacher familiarity with the software through hands-on experience (i.e., knowledge of basic skills, such as how to enter, delete, insert, save, and retrieve text).

Student Prerequisites:

- knowledge of general management functions, such as how to open, save, and retrieve a file;
- knowledge of basic editing functions, including how to move the cursor and insert and delete letters/words/text;
- understanding of how to use the printer;
- some knowledge of the keyboard:
  - Although there is debate as to how much keyboarding skill is required, children who learn some basic keys are able to focus more on the writing task.
  - 6-year-old students can learn the position of the keys and how to use the "hunt-and-peck" method.
  - If no training is provided, some children learn idiosyncratic methods of typing that are hard to correct.
  - Some professionals suggest using keyboarding software to teach skills apart from the word processing program. These programs build skills in increments and monitor individual progress so that students can proceed at their own rate. Examples include: *Stickybear Typing* (Opportunities for Learning, Inc.) and *Type to Learn* (Sunburst Communications).

Requisite Skill Levels

At the preschool level, a child should be able to

- push single keys,
- turn the computer on and off,
- load a disk,
- follow instructions from a three-choice picture menu, and
- take turns with peers.

At the kindergarten level, a child should

- be familiar with the keyboard,
- use the shift key,
- use the return key,
- move the cursor,
- write words using the keyboard, and
- load programs from disks.

At the second-grade level, a child should

- delete letters,
- scroll,
- center the text,
- indent with the space bar,
- create blank lines, and
- retrieve information from a disk.

At the third-grade level, a child should

- insert text, and
- delete words.

Early Writing Activities

Before a child is proficient with written communication, a variety of activities can be presented that provide exposure to word processing. In fact, the microcomputer can be used as the learning tool in the acquisition of written language skills. For example, with an adult, the child can

- dictate a sentence or story to a partner who types it onto the screen,
- rearrange and edit this first draft, and
- use graphics programs to illustrate the text.

With a group, the child can

- compose a group story;
- ask each student to add one line of the story;
- read aloud the finished draft for clarity and mechanical accuracy; and
- revise, as a group, so that no one student is singled out.

Selection of a Word Processing Program

As the advantages of word processing capabilities become more widely recognized, incorporating this training into special education primary classes will be standard practice. Increased emphasis on development of this skill will also result in an increased availability of word processing software. You can ensure selection of word processing software that best meets the needs of your students by choosing programs that incorporate the following features (Knapp, 1989):

- text editing functions, such as
  - writing and editing that can be accomplished simultaneously,
  - simple procedures for moving text around,
  - text modifications that can be completed using insertion/deletion keys as well as search/replace keys, and
  - recovery features that allow retrieval of text that has been accidentally deleted;
- macro feature that allows saving of frequently used information (such as name or assignment headings);
- easy-to-follow print commands;
- screen displays that
  - format text easily;
  - show finished document on the screen; and
  - allow changes in margins, spacing, underlining, and so forth;
- help instructions, including
  - menus, and
  - user friendly manuals;
- compatible programs; and
- spell checker.

Enhanced Written Language

Written composition has been conceptualized as an ongoing process that consists of several stages. Use of word processing as a tool in the writing process can facilitate the child's progression through these stages.

Prewriting Stage

- includes activities that allow the student to verbally express ideas about the writing topic in a supportive environment;
- includes group brainstorming, free-writing, and journal entry activities;
- provides opportunities to draw on previous experiences with the assigned topic and to learn about the perspective of others;
- helps the student to get past the "I don't know what to write" phase; and
- builds the student's confidence in completing the writing task.

Precomposing Stage

- narrows the ideas discussed in the prewriting stage; and
- organizes these ideas in a manner that lends itself to the writing task.

Writing Stage

- develops the draft copy on the word processor; and
- focuses on the expression of ideas rather than correctness of form.

Sharing Stage

- provides the basis for the revision phase;
- involves two-way communication between the writer and the reader;
- solicits feedback regarding the content of the writing to increase clarity of expression;
- involves interaction between student and teacher or among groups of students; and
- depending on the software, allows the teacher to insert comments onto the student's draft without affecting the content of the writing.

Revising Stage (can occur at any point in the writing process):

- Students evaluate their own work for clarity of expression.
- Students add, delete, and rearrange material using the insert and delete keys.
- Students print out each draft to show ongoing progress.

Editing Stage (also occurring at any point during the writing process)

- focuses on the mechanical aspects of the composition, such as grammar, spelling, and punctuation; and
- allows use of the spell checker and thesaurus.

Publication Stage:

- Student produces a permanent, final product that is suitable for display in a personal journal or bulletin board.
- Student uses graphics and different fonts to create interesting documents.
- Student develops a sense that writing is for communication, not simply for earning a grade.

Adult guidance helps students become successful writers on the word processor. As a teacher, your role is to offer support and feedback in the writing process while minimizing control. Study of teacher interactions with children suggests that a number of behaviors correlate positively with progress in literacy (Rosegrant, 1985). Some of these include

- *scaffolding:* temporary support to facilitate the child's move to the next level of functioning;
- *acknowledging:* feedback regarding the significance of the child's behavior; and
- *facilitating:* simplifying tasks and reducing obstacles so the goal can be accomplished.

Examples of activities that incorporate these strategies in the teaching of writing through word processing include (Morocco & Newman, 1986)

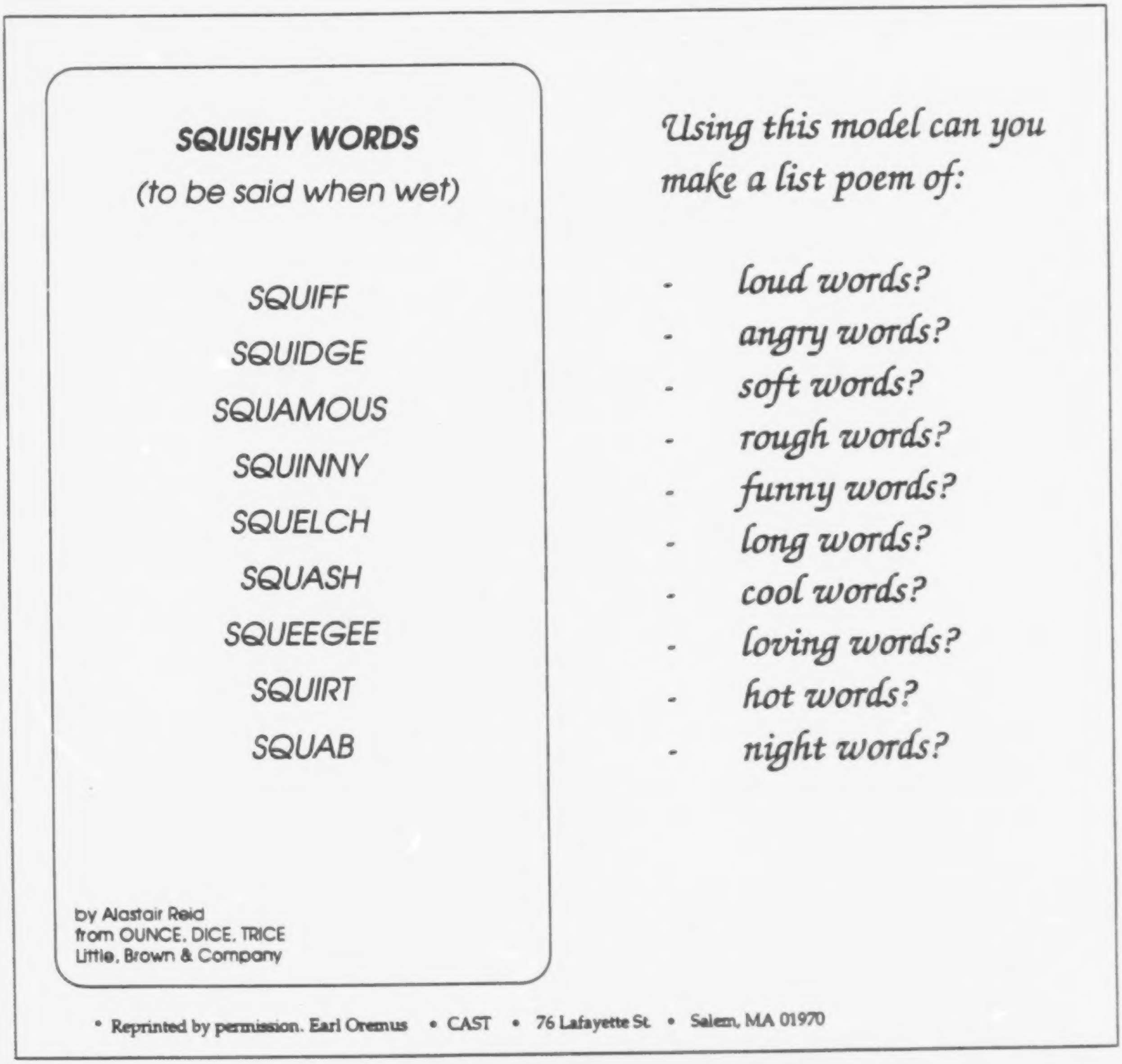
- reading what the student has written and reacting to it on a personal level (e.g., "After reading that paragraph, I feel as if I can almost taste that horrible meal you describe");
- helping the child clarify or expand his or her writing by asking questions that directly relate to what the child has written (e.g., "What is it about the room that makes it feel cheery?");
- helping plan what the child is going to write and review the plan with the child as it is being written (e.g., "You said you were going to concentrate on that nasty bee sting you got. How does this part about the picnic fit in?");
- suggesting strategies for expanding or clarifying what the child has written (e.g., "Think back to when you went through the doors into the emergency room. Write what was going through your mind.");
- listening to what the child is saying and asking him or her to write it down. The child may also need help in remembering exactly what was said (e.g., "That part about how you fooled your neighbor sounds very funny. Write down what you just said");
- typing what the child is saying. The teacher is most likely to type for a student when ideas are flowing and the student is unable to type fast enough to get the ideas down. Teachers can type short phrases on the computer, based on what the child says aloud, which the student can then expand into complete sentences. This technique helps bridge the gap between the richness of a student's verbal account and the same account when it is written down;

- when the child encounters difficulties with the word processor, helping him or her focus on the writing by assisting with particularly difficult commands or steps;
- building self-image as a writer by commenting on the strengths that the child has in common with real authors and by providing assurance that real authors share some of the same frustrations; and
- when you are working with a pair of children, demonstrating the skills described above and encouraging students to use the same strategies you are using when they read each other's work.

Student Activities for Developing Word Processing Skills

The number and type of activities that can be used to develop a student's word processing skills is limited only by your imagination and creativity. Several suggestions are provided below. Additional tried-and-true ideas from teachers are included in Appendix F.

- **Creating sentences**: Store pairs of sentences on a disk. Ask each child to create compound sentences for each pair using a conjunction. Skills practiced can include inserting disks, retrieving and saving files, moving the cursor, and using the print command.
- **Making a story chain**: Use an interesting illustration as a stimulus for a novel story. Each child independently adds a sentence to the story using the preceding sentences as a guide. Other skills practiced include using the shift and return keys.
- **Keeping a journal**: Each student makes daily entries into an electronic diary that is kept on his or her own disk.
- **Writing poetry**: Use poetry writing as a means of creating interesting visual patterns on the computer. Additional skills practiced include use of the space bar and return keys. See Figure 10 for a sample activity that develops use of the center and return keys.
- **Publishing a class newsletter**: Each member of the class can contribute an article about school or community events to the newsletter. An interesting addition is a "letter to the editor" section. The range of skills required can be as simple as just entering text or as complex as desktop publishing.
- **Illustrating stories**: Students can create colorful pictures and then create matching text ranging from simple sentences to short stories. An integrated writing and graphics program is a good investment for this type of learning experience.
- **Developing interactive journals**: Students write to the teacher describing experiences, events, ideas, questions, and so forth, and the teacher writes back on the computer. Through this two-way reading/writing communication, the teacher can model sentence structure, vocabulary usage, etc.



SQUISHY WORDS

(to be said when wet)

SQUIFF
SQUIDGE
SQUAMOUS
SQUINNY
SQUELCH
SQUASH
SQUEEGEE
SQUIRT
SQUAB

by Alastair Reid
from OUNCE, DICE, TRICE
Little, Brown & Company

Using this model can you make a list poem of:

- *loud words?*
- *angry words?*
- *soft words?*
- *rough words?*
- *funny words?*
- *long words?*
- *cool words?*
- *loving words?*
- *hot words?*
- *night words?*

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Figure 10 - Sample poetry activity

Reading and writing skills allow students with severe disabilities to move from restricted environments into life's mainstream. For some, it is the avenue that leads to independence and employment. While functional literacy may not be possible for all individuals, adapted computers and special software can optimize learning for many. As teachers, we must be committed to opening doors and providing opportunities for as many of our students as possible.

Chapter VII Measuring Skill Acquisition

We now come to the part of teaching that many of us do not relish: determining the student's mastery of specific skills. Though we recognize the value and importance of measuring the degree to which a student can complete a task, the most current assessment instruments tend to be inappropriate for use with students who have severe disabilities. In many cases, response requirements and time constraints do not provide the child with the opportunity to demonstrate his or her full range of skills. In other instances, standardized assessment procedures that tap functional skills simply do not exist. Furthermore, there have been very few attempts, even by master teachers and clinicians, to develop evaluation procedures for students who use assistive technology.

This chapter provides strategies for measuring a student's acquisition of various skills using assistive technology tools. Two evaluative strategies are suggested. The one that is selected for a particular student depends on how frequently the skill occurs in the functional setting.

Documenting Changes

Most of us have limited instructional time available, and we often begrudge the time we must give to completing assessment and reassessment activities. In the area of technology, however, it is critical to determine whether a particular assistive tool is beneficial. The cost of equipment alone is enough to justify the need for documenting its appropriateness in the environment. Just as important, though, is the fact that the field of assistive technology is by no means an exact science. Recommendations are often made on a "try and see" basis. An individual often must experiment with a piece of equipment in the everyday environment before decisions regarding its appropriateness can be made. Even when equipment is shown to be functional for an individual child, fine-tuning of the child's ability to use the aid or device is required. For such fine adjustments in equipment or skills to occur, careful documentation of how the child uses that equipment is necessary. This information allows us to develop a precise learning program that is individualized for each student. Finally, as part of the educational system, we are all familiar with accountability. Detailed and accurate measurements of skill changes in individuals who use adaptive devices can only enhance the validity of the field of assistive technology and your credibility as a professional.

Consider the following questions when assessing the student's acquisition of a new skill:

- How effectively and efficiently does the student perform the skill without the use of assistive equipment?
- What is the best way for this student to perform the skill?

- What simple motor responses can be used to perform the skill effectively and efficiently?
- How can the environment be arranged to provide the student with opportunities for spontaneous expression of the skill?
- Can the completion of the task be facilitated through use of adaptations?

Some of these questions may have already been answered during a child's ecological assessment.

Measuring Acquisition and Maintenance of a Target Skill in the Natural Setting

Evaluation of the student's performance of the target skill in the context of real activities helps determine how functional the skill is for that individual. Skills checklists and task analyses are two methods that can be used to determine skill acquisition.

One strategy for monitoring skill acquisition is *to develop a checklist of the activity skills and related skills identified as desirable by the ecological assessment*. You simply count the number of times the child produces the skills during interactions with others. The steps of the procedure are listed below, followed by a case example.

Step 1: **Prepare a list of all target skills. (Skills do not need to be listed sequentially in order of performance or according to their level of difficulty.)**

Step 2: **Note whether the student produces the skill in the functional environment.**

Step 3: **Record the following observations:**

- frequency of skill performance;
- speed and accuracy of skill use over time;
- consistency of performance; and
- human factors affecting skill performance (fatigue, attention, reflexes).

Step 4: **Note the following behavioral characteristics as appropriate:**

- frequency of spontaneous initiation of the skill;
- rate of acquisition of new skill;
- flexibility displayed by student when adapting to new tasks, materials, environments, persons;
- learning modalities;
- preferences; and
- overall strengths and weaknesses.

Case example: Michael is a 7-year-old boy with normal intelligence and cerebral palsy. He has a powered wheelchair and a laptop computer that he uses for both spoken and written communication. He is able to access the system using his finger. Michael is currently in the second grade and has been fully mainstreamed since he was 5 years old. One of the major areas of focus of his current IEP is to develop independence and study habits.

Objective: Michael will complete tasks and assignments during reading group with minimal assistance.

The following checklist was developed by the teacher to determine Michael's independence during reading activities.

Table 2 – Sample skills checklist

Target Skills	**Adaptive Aid/ Strategy**	**Speed/ Accuracy**	**Human Factors**
Comes/leaves reading group			
Answers/asks questions in small group			
Completes seat work			
Writes in journal			

Task analyses can also be used to measure behavioral changes in the acquisition of a target skill. Task analyses are particularly helpful in delineating the part of a skill that is difficult for the child to master. Use the following steps when employing a task analysis procedure to measure changes in behavior.

Step 1: **Develop a task analysis for each target skill by breaking that skill down into individual, discrete steps. While validated task analyses are available for many functional and educational activities, few exist in the area of implementation of technology.**

Step 2: **Execute the task analysis assessment, allowing the student multiple opportunities to successfully complete a task by**

- eliminating steps from the task sequence that the student probably cannot learn because of sensory, physical, or cognitive limitations; and
- incorporating assistive technology into the design of the activity to facilitate the student's completion of the task.

Measuring Skill Acquisition of Infrequently Used Target Behaviors

When a target skill does not occur frequently in a functional situation, it is necessary to engage in more traditional behavioral assessment procedures to evaluate how well the student is acquiring a new skill. Keep in mind that although the use of structured behavioral procedures as a means of measuring skill acquisition certainly has value, these procedures should not be used in place of evaluating performance of the skill in a functional activity whenever possible.

Behavioral assessment procedures provide the student with multiple opportunities to perform the target skill. The two most common strategies are

- employing many consecutive trials during which repeated opportunities for production of the skill are provided within a relatively short period of time; and
- arranging repeated trials that are presented across multiple opportunities throughout the day.

To record the occurrence of target skills in either natural routines or strucutured training, a variety of strategies can be employed. The most common data collection procedures include:

- **Event recording**: noting how often a skill occurs (determined by recording number of occurrences, then dividing by the length of time [in minutes] required to obtain a rate measure).

  Case example: Jackie is a 4-year-old girl with severe spastic quadriplegia. Her cognitive skills fall around the 18- to 24-month level of development. Results of the ecological assessment indicate that Jackie needs to be able to actively explore her environment and to engage in a range of sensory-motor schemes during free play periods. Since her motor impairments preclude direct exploration using her hands or other parts of her body, assistive technology, such as switches and adapted toys, are being introduced. A related skill that is critical for her to engage in this activity is the motor ability to hit and release a switch using her head. The classroom aide will implement a program aimed at directly facilitating the development of this skill.

  Objective: Jackie will hit a switch mounted to the right side of her head within two seconds on verbal request and will release that switch within one second also on verbal request. (Criterion will be at least 10 times within a 90-second interval.)

  Procedure: Jackie will be offered a range of different adapted toys. Under direct supervision of the classroom aide, the switch training program will be implemented. Following the verbal request to hit the switch, she will be allowed to watch each toy in action for six seconds before the command is given to release the switch. Toys will be rotated every few minutes. (Table 3 illustrates the classroom aide's record of Jackie's performance during one 90-second interval. If she does not hit or release the switch in the given time, the number of seconds that she took to accomplish the task is recorded.)

- **Time sampling**: noting whether a target behavior or event occurs within a specific period of time or interval (which yields a measure of the percentage of intervals that the student engaged in a particular behavior or that an event occurred).

Table 3 - Sample event-recording checklist

	Trial									
Behavior	1	2	3	4	5	6	7	8	9	10
Hit	5 sec	✔	✔	✔	Reflex Interferes	4 sec	✔	✔	✔	✔
Release	✔	✔	✔	✔	Reflex Interferes	3 sec	✔	✔	✔	✔

Case example: Lillian is a 6-year-old child with mild mental retardation and limited speech. Her primary mode of communication has been manual sign language. Up to this time, this single modality has been functional in most communication situations because the child has had limited contact with communication partners, all of whom were proficient in sign.

The school is now interested in providing social integration for Lillian by integrating her into the regular education class for several periods each day. Since neither the teachers nor the children know manual sign language, aided communication (i.e., topic-specific picture boards) is being introduced. Lillian has been successfully using topic-specific, direct selection picture boards in treatment; however, there has been little carryover into the classroom, primarily because the communication boards simply are not available for her to use during each activity. A short-term goal, therefore, was added to the Individualized Education Program that stated that topic-specific vocabulary displays are to be present for all classroom activities.

Objective: Lillian will use a multimodal communication system to greet her communication partners at the start of all activities.

Procedure: Every time the class changes activities, an assigned peer will retrieve the topic-specific communication board for that activity and place it on Lillian's wheelchair tray. (A peer training program to carry out this procedure has already been completed.) The teacher or classroom aide will record whether Lillian initiates a greeting (e.g., "Hi! What's new with you?") using her VOCA when initially joining a group of communication partners. Table 4 illustrates a weekly data collection sheet that has been designed to track the presence or absence of the communication board at the start of each activity. A different measuring system will be used to chart the range and frequency of communication acts.

Other methods of data collection include

- **duration recording**: length of time the student engages in a specific behavior (an effective way to measure a child's ability to attend/stay on task);

- **latency recording**: time between the presentation of the cue to perform a task and the student's actual initiation of the task; and
- **scoring by levels**: level of assistance or intervention necessary to facilitate the student's performance.

Table 4 - Sample weekly data collection sheet

Activity	Day 1	Day 2	Day 3	Day 4	Day 5
Arrival/daily set-up	0	0	0	✔	✔
Circle time	✔	✔	✔	✔	✔
Arts and crafts (Integrated with kindergarten)	0	0	✔	✔	✔
Wrap up & dismissal	✔	✔	✔	✔	✔

Determining Long-term Changes in Skill Acquisition

After a student acquires a skill, refinement of that particular skill is often required. This fine-tuning is needed to achieve a more normalized expression of the skill, particularly when assistive technology is employed. Behavioral measurement techniques can be useful in determining long-term change. In addition, certain qualitative skills can be measured through subjective analyses. In this instance, independent ratings of the functionality of a particular skill by significant others in the environment can be used.

Aspects of technology-related skills that often require further development include

- rate of performance of the skill,
- reliability of the student's ability to produce and reproduce the response as needed,
- amount of time between initiation and completion of the target behavior,
- speed and accuracy of the response, and
- quality of the response compared to nondisabled peers' performance of the same response.

Chapter VIII Selling Others on the Merits of Technology

Now that you are aware of the many benefits technology can provide for your students or your child with severe disabilities, you need to realize that not all professionals and families share your enthusiasm. While most are open to computer and augmentative communication use, not all are committed to working toward the integration of this technology into existing curricula. In many instances, you need to "sell" the idea of a district- or school-wide technology program to administrators as well as classroom teachers and related service providers. Although families generally support the integration of computers and assistive technology into the classroom, they are often unsure how this technology can benefit their child at home. A comprehensive in-service technical assistance and training program may be required.

Be aware that a well-run, effective technology requires a great deal of time, energy, and commitment. Even at the local education agency level, a team approach may be the most effective means of meeting the demands of teacher training, on-site support, equipment maintenance, and trouble-shooting.

This section outlines various strategies for developing and implementing programs for professionals and families regarding the merits of assistive technology. As part of the discussion, factors that facilitate and impede the implementation of effective programs are reviewed.

Strategies for Facilitating Change in Professionals

It may seem like an inordinate task to develop a comprehensive yet individualized technology training program for professionals who span the skill continuum. However, the positive outcomes of engaging in initial program planning are well worth the time and effort for several reasons. First, staff development programs tailored to the specific needs of teachers and related service providers result in their personal satisfaction with the program, improved skill levels, and readiness for growth. A personally tailored program also facilitates the participant's feelings of self-esteem and growth as well as their general comfort with technology. Finally, a well-planned and thought-out technical assistance program results in the successful implementation of a district's or school's technology-related goals.

How does one go about designing an assistive technology program tailored to the unique learning needs of a specific school or local educational agency? A good first step is to conduct a needs assessment. A technology training needs assessment is simply a means of judging professionals' attitudes towards and levels of proficiency with different aspects of computers and assistive technology. Furthermore, it identifies areas of interest that can be addressed through in-service training. Let's begin by examining the types of information that can be obtained from a needs assessment.

Conduct a Needs Assessment

Although our ultimate goal is to integrate assistive technology into the teaching curriculum, we need to first determine: what personal reactions professionals have to the use of technology; what types of past experiences, positive and negative, the teacher has had with assistive technology; what barriers were encountered during previous attempts to employ assistive technology with individual students; what was rewarding; and what particular topics in the field of assistive technology are of interest to teachers and other professionals. Let us examine each of these areas in detail.

- **Existing attitudes:** An important factor influencing teachers' interest in a newly created technology program is the type of experiences they have had with other innovative curriculum changes.
  - If these experiences have been positive, teachers tend to embrace the concept of integrating computers and related devices into the learning experience.
  - If these experiences have been negative, research shows that teachers are more resistant to technology.

  Initial responses to the utilization of technology as a teaching strategy vary. Some of the more typical reactions expressed by teachers new to technology include

  - concern that these additional duties will place increased demands on an already heavy teaching workload,
  - lack of understanding of how computers will help improve teaching skills,
  - ambivalence when the technology plan competes with the demands of other school-priority programs, and
  - concern that they must become a computer and/or an assistive device specialist.
- **Existing barriers:** Current barriers to the implementation of assistive technology programs include
  - limited equipment availability and funding, including lack of money for computer personnel and inadequate funds for purchase of hardware and software;
  - limited access to computers and appropriate software during the instructional day because of
    - inadequate numbers of computers,
    - difficulty in scheduling computer lab times, and
    - difficulty getting to the lab because of its location or because of an individual student's mobility problems;
  - small selection of available specialized assistive technology for individual students:
    - Students are unable to learn about all possible equipment options due to limited numbers and types of devices.

    - Students cannot explore the appropriateness of a particular device by using it for an extended period of time (e.g., by taking it home at night, over the weekend, or during the summer).
    - Several students must share one device during the day.
  - limitations in the design and availability of educational programs to allow for the utilization of technology, including
    - lack of staff time to develop lessons that use the computer,
    - difficulty in scheduling computer time due to demand by other classes,
    - not enough instructional time provided for computer-based learning, and
    - limited support staff to assist in supervising students while using devices.
- **Reported benefits and positive outcomes:** Technology is used as a tool for children to solve problems, accomplish tasks, and achieve educational goals.
  - Students show increasing interest and excitement over those subjects that involve the computer.
  - Technology offers increasing ways of making subject matter more interesting and of expanding and applying what has been taught.
  - Skill in the use of technology offers students greater independence and control over their environment.
- **Assistive technology topics that are of interest to professionals:** Specific areas of assistive technology that should be addressed include
  - orientation and computer-literacy training, including hands-on opportunities to practice with equipment (this need is increasingly being met by State Education Agencies [SEAs], commercial publishers, consultants, and various users groups through conferences and preconference workshops);
  - review and selection of software, with suggestions on how to evaluate quality products;
  - use of specialized assistive technology, including hands-on training in the installation and programming of the equipment;
  - matching of specialized assistive devices and strategies with individual students;
  - development of individualized educational programs that are highly dependent on the utilization of technology for their successful implementation; and
  - integration of specialized equipment into the functional environment for individual students.

Design a Comprehensive Technology Training Program

Addressing the barriers and obstacles encountered by other professionals when initiating technology programs will greatly facilitate the process of implementing a program within your educational district/school. In addition, there are a number of other activities that have proven to be instrumental to the success of a professional technology training program. These include

- a district-wide cross-discipline staff development plan for technology that
  - organizes courses so that the focus is practical in nature, and
  - provides incentives to teachers to take courses (e.g., credit for salary advancement, college credit, in-kind credit exchangeable for materials/ supplies);
- a staff development and in-service training program at individual school sites that:
  - employs objectives that directly relate to the staff's unique learning needs in technology, and
  - facilitates the establishment of a technology team at the local school level consisting of the principal, teachers, and development coordinator;
- a lead-teacher network in computer technology and assistive devices that
  - involves the lead computer teacher from each school site and district-wide personnel who have specific computer responsibilities,
  - holds monthly meetings to discuss ways to assist staff in improving their school's computer program,
  - provides for exchange of information and ideas among teachers, and
  - develops a systematic means of disseminating ideas and implementation strategies (derived from the meetings) to all teachers;
- a well-equipped computer practice lab that
  - provides hands-on computer time,
  - offers a range of learning resources and opportunities with peers in which technical assistance is available,
  - encourages sign-out of computers for overnight use, and
  - utilizes adequate support personnel. If funds for staff are limited, consider volunteers and part-time personnel or family members and other interested community members.

At this point you need to be realistic about what you can actually accomplish. Analyze your time, money, and staff resources and plan accordingly. Professionals in the field are the first to admit there is usually more need for technical assistance and direct service than can be filled. To ensure a successful program from the start, commit only what you feel you can handle. You can always increase services later.

Establish an Assistive Technology Specialist Position

If your technology training program incorporates the previous points, you are on your way to providing an exemplary technical assistance and training project. Exemplary service delivery programs, however, need to be organized and implemented by exemplary service providers, and an assistive technology program is no different. In addition to possessing extensive knowledge of the range of assistive technology available and how to use this equipment in teaching, a specialist in this area must possess strong interpersonal and organizational skills. From surveys of best-practice programs, we know that an effective technology specialist must possess

- technical knowledge about
  - general computer use and the range of software appropriate to different levels and special needs,
  - recent research and development in assistive technology,
  - how to use technology as a tool for teaching the existing curriculum,
  - specific teaching strategies for integrating assistive technology, and
  - avenues for funding personal devices for individual students;
- strong interpersonal and organizational skills, including
  - initiative and tenacity to keep the program going,
  - skill in gradually making teachers more independent in their use of assistive technology,
  - ability to facilitate group functioning and decision making,
  - empathy for teachers and clinicians regarding the complexities of learning about and becoming comfortable using technology as a standard teaching tool,
  - background and experiences that are similar to those of the teachers and other clinicians,
  - ability to play down expertise and resist the tendency to refer to oneself as the "expert," and
  - willingness to provide support and training functions on a regular and ongoing basis.

Examination of exemplary programs have also resulted in guidelines for establishing a technology specialist position. Suggested practices include

- selecting specialists from existing staff (if possible, provide at least a half-time position in a medium to large school);
- considering interpersonal skills as equally important as technical expertise;
- agreeing that if an outside consultant is required, interpersonal skills must be a priority;

- recognizing that a program usually must be in operation for two to three years before teachers use technology independently and successfully integrate it into their teaching practice; and
- considering long-range planning goals such as
  - recognizing that teachers need to assume ownership of the program if it is to be successful, and
  - encouraging the specialist to establish and work through a technology committee.

Implement Strategies That Encourage Teachers' Use of Technology

Now that we have reviewed the overall organization and structure of an exemplary technology program, we can begin to describe specific strategies for developing professionals' knowledge and practical skill in the use of assistive technology. These technical assistance strategies can be grouped into four areas, including resource-adding, organizing and preparing, training, and collaborative problem-solving (Strudler & Gall, 1988).

- **Resource-adding strategies:** Increase the materials available to both professionals and individual teachers. When adequate equipment exists, the credibility of the coordinator is heightened. Furthermore, administrative interest in allocating instructional time to technology training activities tends to increase. Examples of effective resource-building activities include
  - seeking grants from outside sources,
  - soliciting monies from the Local Education Agency (LEA) budget,
  - establishing a centralized lending library of hardware and software, and
  - coordinating sharing of materials among schools.
- **Organizing and preparing strategies:** Deal with day-to-day program operation and include the provision of support services to classroom teachers and clinicians. Teachers have expressed positive reactions to and appreciation of assistance with the following tasks:
  - organizing and scheduling computer lab time,
  - screening and identifying software that meets the needs of student and teacher,
  - prebooting computer labs prior to scheduled class times,
  - assisting with custodial chores,
  - programming specialized assistive devices for individual students, and
  - assisting in daily maintenance and equipment checks of individual student's assistive devices.
- **Collaborative problem-solving strategies:** Employ groups of teachers and related service providers to effect change in the content and delivery of instruction. At this more general level of systems change, the following strategies are effective:

  - arranging ongoing teacher training and individual technical assistance,
  - involving small groups of teachers grouped by grade/content in the development of the technology program,
  - working with the school computer committee toward the evaluation and selection of hardware and software,
  - involving teachers in making decisions about procedures and timelines for integrating technology into the classroom for groups as well as for individual students,
  - providing necessary materials and equipment so that teachers can implement the technology integration plan,
  - organizing family member support for the development and implementation of a school-wide computer program, and
  - networking teachers in the district who are interested in using technology as tools for teaching.

- **Teacher training strategies:** Often directed at two levels of interaction, including in-service training to groups of professionals, and coaching provided on an individual basis. As you begin to implement a district- or school-wide technology plan, you need to be sensitive to the range of reactions that individuals may have to your program. You may need to facilitate a professional's move along a continuum of acceptance of using technology as a teaching tool. Initially, teachers may be concerned only with how this new methodology affects them personally. Many are uncomfortable and threatened by the seemingly sophisticated equipment. Feelings of incompetency, both with the mechanics of operation and the integration of these devices into the functional environment, are not uncommon. As the teacher's level of comfort with the use of technology increases, however, they begin to focus on how this new technology affects the student. At this point, teachers become interested in expanding their knowledge base of technology.
  - In-service instruction to groups of professionals on the following topics or formats is often well-received:
    - software preview labs containing preselected materials specific to the professional's content area or grade level;
    - brief demonstrations of the mechanics of operating individual devices, followed by ample practice time;
    - demonstrations of low-cost, teacher-made assistive devices that can be easily constructed using commercially available materials;
    - specific strategies and detailed procedures on how to use technology to facilitate the acquisition of literacy skills, social interaction (e.g., expression of ideas, interests, and experiences), and participation in leisure activities; and
    - case-study presentations that explore the problem-solving process of identifying and integrating assistive technology into the functional environment.

- Individual coaching of professionals on a one-to-one basis is an excellent means of providing follow-up support. Such coaching
  - offers a means of energizing and motivating teachers to accept and enjoy using technology as a teaching tool,
  - affords non-evaluative and non-judgmental support to those teachers and related service providers who continue to be reluctant and unsure of their ability to use technology,
  - provides a means for troubleshooting and problem solving operational problems encountered with specific equipment,
  - allows modeling of effective "best-practice" strategies and techniques for the integration of technology across all life environments, and
  - fosters the development of a team.

Facilitating Family-Teacher Relationships

A comprehensive education program for children with severe disabilities involves more than just the continuing education of teachers and related service personnel. The need for family involvement in the instructional process is equally important. The remainder of this section is devoted to strategies for enhancing family-teacher relationships so that technology can become an integral part of all aspects of a child's everyday life.

We approach this section with the understanding that it is difficult to ensure ongoing family participation in the educational process. This is particularly true when the student possesses severe disabilities that require medical and therapeutic as well as educational management. The coordination of such services alone is a paramount task. The added task of integrating several pieces of bulky and awkward equipment into a family's daily routine is often more than they can handle. Therefore, it is important to remember that assistive technology should be employed in the home and community only to the degree to which it facilitates the child's acquisition of a particular goal. If the use of a particular piece of equipment disrupts or further impedes the completion of a task, then its use in that particular situation should be rethought. With this in mind, let us consider strategies for enhancing family participation in the implementation of technology in the school, home, and community.

Strategies for Facilitating Family Involvement

Successful implementation of an environmentally based educational program requires active participation of all significant others involved in a child's life. Psychosocial issues, cultural backgrounds, and existing family dynamics can hinder a family's ability to be actively involved in the development and implementation of an Individualized Family Service Plan or an Individualized Education Program. This is particularly true when the use of technology is required because of a child's complex and/or multiple disabilities.

Families can improve relationships with teachers by being sensitive to a teacher's desire to achieve educational objectives and the demands on his or her time. Teachers, in turn, should consider the following:

- The emotional reactions of families of children with severe disabilities are normal and necessary.
- Families are capable of solving their own problems; their solutions may not be the teachers' solutions, but they may be more effective for that particular family.
- The progress and/or needs of the child with disabilities may not be the most important issue for a family at a particular time.
- All families can be involved, but to widely differing degrees, in the educational progress of their children with disabilities.
- Families have information about the children that is critical to the development of sound educational programs.

Strategies for Establishing Effective Communication

There are a number of general principles that help establish and maintain a cooperative relationship between families and teachers:

- Teachers should actively cultivate and maintain relationships with families and vice versa throughout the school year. Formal communication mechanisms that ensure frequent, ongoing interaction should be established. Good communication enables families to share their social, academic, and community goals for their children with the teachers.
- Families should actively participate, to whatever extent possible, in the assessment of their child (e.g., through the use of the ecological assessment).
- Together, families and teachers should be committed to increasing the independence of the child and to facilitating the child's participation in least-restrictive environments.
- Families must demonstrate to the teacher how technology assists the child in achieving tasks at home; the teacher must demonstrate how technology assists the child in achieving tasks in the classroom.
- Teachers need to realize that families will implement assistive technology only when they believe this technology can be easily integrated into their existing lifestyle and the activities of the family and community.
- Families can expect that a teacher will suggest technology-related home activities and strategies only after he or she has had first-hand practice implementing these procedures. These experiences will provide a reality and experiential base from which practical and functional recommendations can be generated.
- Families and teachers need to be available to offer help or support to one another.
- Families need to be ready to educate teachers about the culture and values of their family and their community.

- Teachers need to help family members coordinate services in a community by communicating with physicians, clinicians, technology/seating clinics, etc.
- Above all, families can expect teachers to be good listeners so that, by working together, goals can be coordinated and prioritized.

In addition, the following suggestions for promoting teacher-family relationships are provided by family member/professional organizations:

- Families can expect a teacher to establish contact within the first month of the school year or directly upon receiving the child as a new student.
- Both families and teachers should seek face-to-face contact whenever possible.
- Families can expect an invitation from the teacher to visit the school program within the first month. This
  - allows the family to observe firsthand the types of learning experiences their child will encounter, and
  - provides an opportunity for the teacher to explain the nature of the program.
- The family should also expect the teacher to make a home visit at least once a year.
- All significant family members should be present during conferences. (Teachers need to establish relationships with all family members, as there is a tendency to have contact with only one member.) Because of busy schedules, teachers and families need to work together when scheduling conferences.
- Families need to make teachers aware of the role of other adults in care providing activities (e.g., the babysitter). These individuals need to be considered in the implementation of the educational plan.
- Teachers and family members need to be sensitive to the effect the child with disabilities may have on other children in the family.
  - Siblings may be overwhelmed with feelings of responsibility for their brother or sister, fear of the disability, or a sense of loneliness, guilt, or isolation.
  - Teachers and family members can work together to address these issues with the siblings or to seek out counseling regarding their management.

During an initial contact, a family can expect a teacher to

- establish good rapport by being friendly, enthusiastic, and showing concern;
- be a good listener, thus determining if his or her program goals are the same as the family's goals;
- establish general agreement as to the teaching procedures and strategies that will be used to implement the technology program;
- demonstrate and provide hands-on experience with the types of technology the child will be using;

- explain how these devices will facilitate the child's learning and/or independence;
- give specific examples of how the child will use this specialized equipment to participate in social, educational, and recreational activities;
- help the family incorporate the technology program into their existing schedule and life-style; and
- proceed actively with a description of the program only when a consensus on educational goals, teaching methods, and types of technology tools is established.

Families and teachers need to realize that the family and the child make the final decisions.

Strategies for Maintaining Cooperation in the Educational Program

Interaction between families and professionals changes as the child moves from the preschool environment to the elementary level classroom.

At the preschool level, the major goal is to

- facilitate and develop naturally occurring interactions between a child and his or her family members; and
- make decisions about the kind and number of toys that are appropriate based on the child's motor skill, chronological age, and developmental level.

At the elementary level, the family's role shifts to being actively involved in the implementation of specific activities related to technology use.

One of the most effective strategies for maintaining ongoing cooperation in a technology program is to establish a daily log that travels between school and home. By using the log:

- Teachers can include comments on performance of instructional tasks as well as social interaction and behavior.
- An avenue for relating special activities or unscheduled events can be established, thus providing a wealth of conversational topics.
- Families have an opportunity to share family happenings (and perhaps the child's fatigue as a result of them) and to describe the child's use of assistive technology at home and in the community.

Besides maintaining a daily, written log, other alternatives include

- weekly logbooks, in cases where families are unable to maintain daily logs
- pictographic symbols to augment written text, audiotapes or videotapes as the interactive exchange medium, or telephone calls for periodic updates. These strategies are helpful for families who have difficulty reading or are experiencing

a language barrier; and

- face-to-face interaction (both in the home and at school) in the form of monthly or bimonthly conferences and opportunities to learn and practice instructional skills within a supportive environment.

Families that cannot be actively involved in the educational programs of their children can anticipate other forms of contact to be kept abreast of their children's ability to employ general and/or assistive technology. Some strategies that might be used include

- an introductory letter from the teacher at the beginning of the school year that provides a brief description of the educational program,
- sending home examples of work and descriptions of progress on a monthly or quarterly basis,
- videotapes of the child's performance to illustrate information conveyed through the written narrative, and
- home visits at least twice a year to demonstrate the child's use of assistive technology and to model strategies for integrating technology into the daily activities of the family.

All of these strategies help to dispel the mystique surrounding the intervention process and thus facilitate family-teacher team building.

Many exemplary education programs provide not only for the instruction of students but for the social and emotional needs of families of children with disabilities. A teacher should not feel that addressing the multiple needs of a family with a child who has severe disabilities is his or her sole responsibility. Instead, these activities should be shared by other professionals, including administrators, guidance counselors, and family member/teacher liaison workers. In particular, families have benefited from

- family support groups that provide
  - discussions with other families having similar problems;
  - support for siblings;
  - information on advocacy, legal issues, and community-living options; and
  - information that directly improves the parents' skills as parents and as learning facilitators;
- opportunities for respite and cooperative child care;
- fund-raising and advocacy activities that directly benefit the program;
- establishment of contacts with existing community agencies and national organizations; and
- social contacts provided through occasional weekend or evening family activities organized through the school.

Integrated into the educational program, these activities will result in a comprehensive, effective, technology-related program that meets the range of needs of students with severe disabilities.

This chapter has sought to present strategies that can be used by both families and professionals to ensure that children with severe disabilities have a technology-rich environment. These strategies have suggested that education goes back and forth between families and professionals and that a coordinated effort is the only way in which a child's use of technology can become a natural part of all life environments.

Chapter IX Summary

Technology in the classroom is now a reality, not just a vision. Computers, augmentative communication devices, and environmental controls are being recognized as primary learning tools for children with disabilities at home, in school, and in the community. Utilization of such equipment allows many children who would otherwise be segregated from their peers to be maintained in least restrictive settings. It affords these children a means of self-control, a way to maximize independence, and an opportunity for improved quality of life.

The purpose of this module has been to offer a framework by which families, teachers, and other professionals can integrate technology into the daily learning activities of children with severe disabilities. Its goal has been to provide specific instructional strategies and techniques that can be easily integrated into existing educational situations. Most importantly, it has strived to develop confidence and a level of comfort in those who will be using technology to facilitate the acquisition of literacy, daily living skills, and social interaction in this particular group of students.

We admit we have only brushed the surface of the users of assistive technology in the classroom. Yet, if we have increased your knowledge or awakened your interest, then to this end we have been successful.

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Appendix A Assistive Technology Resource List

State Resources

Pursuant to federal legislation, the following states have been funded to develop consumer responsive, statewide, technology-related service delivery. For information about this project, contact

Carol G. Cohen
Rehabilitation Program Analyst
National Institute on Disability and Rehabilitation Research (NIDRR)
U.S. Department of Education
400 Maryland Avenue, SW
Washington, DC 20202-2645
(202) 732-5066

Alaska
Joyce Palmer
Program Coordinator
Alaska Assistive Technology Services
Division of Vocational Rehabilitation
400 D Street, Suite 230
Anchorage, AK 99501
(907) 274-0138
FAX (907) 274-0516

Arkansas
Sue Gaskin
Project Director
Department of Human Services
Division of Rehabilitation Services
Increasing Capabilities Access Network
2201 Brookwood Drive, Suite 117
Little Rock, AR 72202
(501) 666-8868
(800) 828-2799 (in state)
FAX (501) 666-5319

Colorado
Bill West
State Coordinator for Assistive Technology
Rocky Mountain Resource and Training Institute (RMRTI)
6355 Ward Road, Suite 310
Arvada, CO 80004
(303) 420-2942
FAX (303) 420-8675

Connecticut
Jon A. Alander
Commissioner
Connecticut State Department of Human Resources
Bureau of Rehabilitation Services
1049 Asylum Avenue
Hartford, CT 06105
(203) 566-3318

Delaware
Beth A. Mineo
University of Delaware
Center for Applied Science and Engineering
1600 Rockland Road
Wilmington, DE 19899
(302) 651-6834

Florida
Jay E. Yourist
Department of Labor and Employment
Division of Vocational Rehabilitation
Bureau of Client Services
Rehabilitation Engineering Technology
1709-A Mahan Drive
Tallahassee, FL 32399-0696
(904) 488-6210

Georgia
Joy Kniskern
Georgia Department of Human Resources
Georgia Division of Rehabilitation Services
878 Peachtree Street, NE
Room 702
Atlanta, GA 30309
(404) 853-9151
(404) 894-7593

Hawaii
Laurie Hirohata
Project Director
HATS (Hawaii Assistive Technology System)
1000 Bishop Street, Suite 302
Honolulu, HI 96813
(808) 521-8489

Idaho
Bryce Fifield / Lee Parks
University Center on Developmental Disabilities
Professional Building
129 W. Third Street
Moscow Latah, ID 83843
(208) 885-6849

Illinois
Terri Dederer
Project Liaison
Illinois Assistive Technology Project
Department of Rehabilitation Services
Division of Planning and Special Initiatives
411 East Adams Street
Springfield, IL 62701
(217) 785-7091
(217) 522-7985

Indiana
Sandra Metcalf
Project Manager
Indiana Department of Human Services
Office of Vocational Rehabilitation
Technology Assistance Unit
150 West Market Street
PO Box 7083
Indianapolis, IN 46207-7083
(317) 233-3394

Iowa
James C. Hardy
Director
Iowa Program for Assistive Technology
University Hospital School
Iowa City, IA 52242
(319) 353-6386
FAX (319) 356-8284

Kentucky
Janice Weber
Director
Kentucky Assistive Technology Service (KATS) Network
KATS Network Coordinating Center
427 Versailles Road
Frankfort, KY 40601
(502) 564-4665
(800) 327-KATS
FAX (502) 564-3976

Louisiana
Jill Rivers
Project Director
Louisiana State Planning Council on Developmental Disabilities
Department of Health and Hospitals
PO Box 3455
Baton Rouge, LA 70821-3455
(504) 342-6804

Maine
Kathleen Powers
Project Director
Division of Special Education
Maine Department of Education
State House Station #23
Augusta, ME 04330
(207) 621-3195
(207) 289-2550 (TDD)
FAX (207) 289-5900

Maryland
Mary Brady
Executive Director
Maryland Technology Assistance Project
Governor's Office for Handicapped Individuals
300 West Lexington Street
1 Market Center - Box 10
Baltimore, MD 21201
(301) 333-3098
FAX (301) 555-3280

Massachusetts
Judy Brewer
Project Coordinator
MATP Center
Gardner 529
Children's Hospital
300 Longwood Avenue
Boston, MA 02116
(617) 735-7820
(617) 735-7301 (TDD)

Michigan
Peter P. Griswold
Michigan Department of Education
Michigan Rehabilitation Services
PO Box 30010
Lansing, MI 48909
(517) 373-3391

Minnesota
Rachel Wobschall
Executive Director
Star Program
Minnesota State Planning Agency
300 Centennial Building
658 Cedar Street
St. Paul, MN 55155
(612) 297-1554
FAX (612) 296-3698

Mississippi
Pete Martin
Project Director
Division of Rehabilitation Services
Department of Human Services
PO Box 1698
Jackson, MS 39215-1698
(601) 354-6891

Missouri
Diane Golden
Director
Missouri Assistive Technology Project
UMKC, School of Education
5100 Rockhill Road
Kansas City, MO 64110
(816) 235-5337

Montana
Peter Leech
MonTech
Rural Institute on Disabilities
The University of Montana
52 Corbin Hall
Missoula, MT 59812
(406) 243-4597

Nebraska
Mark Schultz
Project Director
Assistive Technology Project
Nebraska Department of Education
Division of Rehabilitation Services
301 Centennial Mall South
PO Box 94987
Lincoln, NE 68509-4987
(402) 471-0735
(800) 742-7594
FAX (402) 471-2701

Nevada
Donny Loux
Chief
Program Development
Rehabilitation Division, PRPD
505 East King Street, Room 502
Carson City, NV 89710
(702) 687-4452

New Hampshire
Joan Bergman
Project Coordinator
New Hampshire Technology Partnership Project
Institute on Disability
#14, Ten Ferry Street
The Concord Center
Concord, NH 03301
(603) 224-0630

New Jersey
Howard Luckett
New Jersey Department of Labor
Office of the Commissioner
Commissioner Raymond L. Bramucci
Labor Building, CN 110
Trenton, NY 08625
(609) 984-6550

New Mexico
Andy Winnegar
Director
New Mexico Technology-Related Assistance Program
435 St. Michael Drive, Bldg. D
Santa Fe, NM 87503
(505) 827-3533

New York
Deborah V. Buck
Project Manager
NY State Office of Advocate for the Disabled
TRAID Project
One ESP - 10th Floor
Albany, NY 12223-0001
(518) 474-2825

North Carolina
Ricki Cook
Project Director
North Carolina Assistive Technology Project
Department of Human Resources
Division of Vocational Rehabilitation Services
1110 Navaho Drive, Suite 101
Raleigh, NC 27609
(919) 850-2787

Ohio
Linda McQuistion
Ohio Rehabilitation Services Commission
Division of Public Affairs
400 E. Campus View Blvd.
Columbus, OH 43235-4604
(614) 438-1236

Oklahoma
Paul Bowerman
Oklahoma Department of Human Services
Rehabilitation Services Division
DHS, RS #24
PO Box 25352
Oklahoma City, OK 73125
(405) 424-4311

Oregon
Gregory Fishwick
Project Director
Technology Access for Life Needs (TALN)
Oregon Vocational Rehabilitation Division
Department of Human Resources
2045 Silverton Road, NE
Salem, OR 97310
(503) 378-3830, ext. 386 (Voice/TDD)

Pennsylvania
Diane Nelson Bryen
Temple University of the Commonwealth System of Higher Education
Institute on Disabilities/UAP
13th Street & Cecil B. Moore Avenue
Philadelphia, PA 19122
(215) 787-1356

South Carolina
Lanelle C. Durant
South Carolina Vocational Rehabilitation Department
PO Box 15
West Columbia, SC 29171-0015
(803) 822-5404

South Dakota
David Miller
Department of Human Services
Division of Rehabilitation Services
Kneip Building
700 Governors Drive
Pierre, SD 57501
(605) 773-3195

Tennessee
Jimmie Williams
Project Director
Tennessee Technology Access Project
Department of Mental Health and Mental Retardation
3rd Floor, Doctors' Building
706 Church Street
Nashville, TN 37243-0675
(615) 741-7441

Texas
William A. Myers
The University of Texas at Austin
UAP of Texas
Department of Special Education
PO Box 7726
Austin, Travis County, TX 78713-7726
(512) 471-7621

Utah
Marvin Fifield
Director
Utah Assistive Technology Program (UATP)
Utah State University
Developmental Center for Handicapped Persons
Logan, UT 84322-6855
(801) 750-1982
FAX (801) 750-2044

Vermont
Jesse Barth
Director
Assistive Technology Project
Department of Aging and Disabilities
Agency of Human Services
103 South Main Street
Waterbury, VT 05676
(802) 241-2620
FAX (802) 244-8103

Virginia
Kenneth H. Knorr, Jr.
Director
Virginia Assistive Technology System
Department of Rehabilitative Services
4901 Fitzhugh Avenue
PO Box 11045
Richmond, VA 23230
(804) 367-2445
(804) 367-0315 (TDD)
FAX (804) 367-9256
(800) 552-5019

West Virginia
Tom Minshall
Division of Rehabilitation Services
West Virginia Rehabilitation Services
Capital Complex
Charleston, WV 25301
(304) 766-4698

Wisconsin
Judi Trampf
Director, WisTech
Division of Vocational Rehabilitation
1 West Wilson Street, Room 950
PO Box 7852
Madison, WI 53702
(608) 267-6720
(608) 266-9599 (TDD)

Organizations/Agencies*

Activating Children Through Technology (ACTT)
c/o Western Illinois University
27 Horrabin Hall
Macomb, IL 61455
(309) 298-1634

This university-based center supports a technology resource center that offers information dissemination, training, and evaluation services in microcomputer applications and related technology areas to individuals who are disabled.

Alliance for Technology Access
Apple Computer, Inc.
20525 Mariani Avenue, MS 43S
Cupertino, CA 95014
(415) 528-0747

The alliance was developed in association with the Disabled Children's Computer Group by Apple Computer's Office of Special Education Programs. This organization conducts research and provides information dissemination, database resources, referral services, and training related to the implementation of microcomputer technology with children and adults who are disabled. The alliance currently is developing model assistive technology sites across the United States.

American Occupational Therapy Association (AOTA)
1383 Piccard Drive
PO Box 1725
Rockville, MD 20850-0822
(301) 948-9626

American Physical Therapy Association (APTA)
1111 N. Fairfax
Alexandria, VA 22314
(703) 684-2782

American Speech-Language-Hearing Association (ASHA)
10801 Rockville Pike
Rockville, MD 20852-3279
(800) 638-6868 (members) (voice or TDD)
(800) 638-8255 (consumers) (voice or TDD)

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Apple Computer, Office of Special Education
20525 Mariani Avenue, MS 43S
Cupertino, CA 95014
(408) 974-8601

Through this office, Apple Computer works with rehabilitation, education and advocacy organizations nationwide to identify computer-related needs of individuals who are disabled and to assist in the development of responsive programs. Apple maintains a database of hardware, software, publications, and organizations involved in the use of assistive technology.

Association for Retarded Citizens (ARC)
ARC National Headquarters
500 E. Border
Suite 300
Arlington, TX 76010
(817) 261-6003
(817) 277-0553 (TDD)

ARC is the nation's largest volunteer organization solely devoted to improving the lives of all children and adults with mental retardation and their families. The association also fosters research and education regarding the prevention of mental retardation in infants and young children.

Blissymbolics Communication International
250 Ferrand Drive, Lower Concourse
Don Mills, Ontario M3C 3P2 Canada
(416) 421-8377

This organization is dedicated to the development and dissemination of Blissymbolics as a communication system for people who do not speak.

Carolina Literacy Center
Department of Medical Allied Health Professions
Campus Box #8135
University of North Carolina at Chapel Hill
Chapel Hill, NC 27599-8135
(919) 966-7486

In addition to other services, this center strives to meet the needs of people with severe speech and physical impairments through literacy symposiums/workshops and to make available publications on the topic of literacy.

Closing the Gap, Inc.
PO Box 68
Henderson, MN 56044
(612) 248-3294

This organization offers regional and national conferences, workshops, and training. CTG also publishes a newspaper dedicated to the application of assistive technology with individuals who are disabled.

Committee on Personal Computers and the Handicapped (COPH-2)
PO Box 7701
Chicago, IL 60680-7701
(708) 866-8195

This consumer organization disseminates information, provides technical consultations, and sells adaptive computer devices. The organization also publishes information resources and supports an electronic bulletin board.

Hear Our Voices
105 W. Pine Street
Wooster, OH 44691
(216) 262-4681

A national patient advocacy group run by Prentke Romich Company. Any augmentative communication aid user or family member can join this organization.

IBM National Support Center for Persons with Disabilities (IBM-NSCPD)
PO Box 2150
Atlanta, GA 30055
(800) 426-2133

This IBM support center provides information, referral, advocacy, and demonstration center services. The center provides specific IBM computer applications and resources for individuals who are disabled.

International Society for Augmentative and Alternative Communication (ISAAC)

United States Society for Augmentative and Alternative Communication (USSAAC)
PO Box 1762, Station R
Toronto, Ontario M4G 4A3 Canada
(416) 737-9308

The purpose of these organizations is to facilitate the international and national advancement of the transdisciplinary field of augmentative and alternative communication.

National Federation for the Blind
1800 Johnson Street
Baltimore, MD 21230
(301) 659-9314

A national organization with more than 500 state and local chapters. The organization provides information dissemination, advocacy, referral services, database, and resource support services to persons who are visually impaired.

National Lekotek Center
CompuPlay
711 E. Colfax
South Bend, IN 46617
(219) 233-4366

CompuPlay provides computer play sessions for family members and children with special needs ages 2 to 14. Adaptive equipment and software are employed to allow children to play and learn. The organization provides a software lending library and computer demonstration center.

RESNA – Association for the Advancement of Rehabilitation Technology
1101 Connecticut Avenue, NW, Suite 700
Washington, DC 20036
(202) 857-1199

RESNA plans and conducts scientific, technical, and educational meetings and programs; serves as a forum for the development of standards, terminology, and guidelines; and provides consultation and coordination concerning matters of interest to RESNA members. It also publishes and disseminates information on technology and service delivery.

TASH – The Association for Persons with Severe Handicaps
11201 Greenwood Avenue North
Seattle, WA 98133
(206) 361-8870

The purpose of TASH is to create a community where no one is segregated and everyone belongs. TASH is dedicated to research, education, dissemination of knowledge and information, legislation, litigation, and excellent services.

Technology and Media Division (TAM)
Council for Exceptional Children
1920 Association Drive
Reston, VA 22091-1589
(703) 620-3660

This division of the Council for Exceptional Children keeps abreast of advances in special education technology. The organization provides information dissemination and referral services and offers several publications on the use of technology.

Trace Research and Development Center
1500 Highland Avenue, S-151 Waisman Center
Madison, WI 53705
(608) 262-6966
(608) 263-5408 (TDD)

The Trace Center develops and disseminates information related to nonvocal communication, computer access, and technology to aid individuals who are disabled. The center also conducts research and training in technology.

UCLA Intervention Program for Handicapped Children
1000 Veteran Avenue, Room 23-10
Los Angeles, CA 90024
(213) 825-4821

This university-based technology program has developed software for use with individuals who are disabled. The program also supports a resource center and is actively involved in technology training activities.

Periodicals*

Accent on Living
Published by
Cheever Publishing
PO Box 700
Bloomington, IL 61701

American Journal of Audiology:
A Journal of Clinical Practice
Published by the
American Speech-Language-Hearing Association (ASHA)
10801 Rockville Pike
Rockville, MD 20852-3279
(301) 897-5700 (voice or TDD)

American Journal of Speech-Language Pathology:
A Journal of Clinical Practice
Published by the
American Speech-Language-Hearing Association (ASHA)
10801 Rockville Pike
Rockville, MD 20852-3279
(301) 897-5700 (voice or TDD)

American Occupational Therapy Journal
Published by the
American Occupational Therapy Association
1383 Piccard Drive
Rockville, MD 20850-0822
(301) 948-9626

Assistive Device News
Newsletter published by
Central Pennsylvania Special Education Regional Resource Center
150 S. Progress Avenue
Harrisburg, PA 17109
(717) 657-5840

Assistive Technology
Published by
Demos Publications
156 Fifth Avenue, Suite 1018
New York, NY 10010
(212) 857-1199

Assistive Technology Quarterly
Published by
RESNA Press
1101 Connecticut Avenue NW, Suite 700
Washington, DC 20036
(202) 857-1140

Augmentative and Alternative Communication (AAC)
Sponsored by the
International Society for Augmentative and Alternative Communication (ISAAC)
Published by
Decker Periodicals Publishing, Inc.
PO Box 620, Station A
Hamilton, Ontario L8N 3K7 Canada
(416) 522-7017

Augmentative Communication News
Published by
Augmentative Communication, Inc.
One Surf Way, Suite #215
Monterey, CA 93940
(408) 649-3050

Closing the Gap
Newspaper
Address correspondence to:
Closing the Gap
PO Box 68
Henderson, MN 56044
(612) 248-3294

Communication Outlook
An Affiliate of ISAAC.
Published by
Communication Outlook
Artificial Language Laboratory
Michigan State University
405 Computer Center
East Lansing, MI 48824-1042
(517) 358-0870

Communicating Together
An affiliate of ISAAC.
Published by
Sharing to Learn
PO Box 986
Thornhill, Ontario L3T 4A5 Canada

Computer-Disability News
Published by
National Easter Seal Society
5120 S. Hyde Park Blvd.
Chicago, IL 60615
(312) 667-8400

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Computer Teacher (The)
Published by
International Society for Technology in Education
1787 Agate Street
Eugene, OR 97403-1923
(503) 346-4414

Educational Technology
Published by
Educational Technology
720 Palisade Avenue
Englewood Cliffs, NJ 07632
(201) 871-4007

Exceptional Parent
Published by
Boston University, School of Education
605 Commonwealth Avenue
Boston, MA 02215

Journal of Applied Behavior Analysis (JABA)
Published by the
Society for the Experimental Analysis of Behavior, Inc.
Address correspondence to
Business Manager, Mary Louise Wright
Department of Human Development
University of Kansas
Lawrence, KS 66045

Journal of Speech and Hearing Research (JSHR)
Published by the
American Speech-Language-Hearing Association (ASHA)
10801 Rockville Pike
Rockville, MD 20852-3279
(301) 897-5700 (voice or TDD)

The Journal of the Association for Persons with Severe Handicaps (JASH)
Published by the
Association for Persons with Severe Handicaps (TASH)
7010 Roosevelt Way, NE
Seattle, WA 98115

Language, Speech, and Hearing Services in Schools (LSHSS)
Published by the
American Speech-Language-Hearing Association (ASHA)
10801 Rockville Pike
Rockville, MD 20852-3279
(301) 897-5700 (voice or TDD)

Physical Therapy
Published by the
American Physical Therapy Association
1111 N. Fairfax
Alexandria, VA 22314
(703) 684-2782

Research in Developmental Disabilities
Published by
Pergamon Press, Inc.
Maxwell House
Fairview Par
Elmsford, NY 10523
or
Pergamon Press plc
Headington Hill Hall
Oxford OX3 0BW, England

Team Rehab Report
Published by
Miramar Publishing Company
6133 Bristol BHW
PO Box 3640
Culver City, CA 90231-3640
(213) 337-9717
(800) 543-4116

Technology and Disability
Published by
Andover Medical Publishers, Inc.
80 Montvale Avenue
Stoneham, MA 02180
(800) 366-2665

Topics in Language Disorders
Published by
Aspen Publishers, Inc.
7201 McKinney Circle
Frederick, MD 21701
(800) 638-8437

TRACES Newsletter
Published by
Teaching Research Division
Western Oregon State College
345 N. Monmouth Avenue
Monmouth, OR 97361
(503) 838-8778

VOICES
Newsletter published by
Hear Our Voices
105 West Pine Street
Wooster, OH 44691
(216) 262-4681

Funding Resources*

Assistive technology: A funding workbook (1991)
By: Morris, M., & Golinker, L.
RESNA Technical Assistance Project
1101 Connecticut Avenue, NW, Suite 700
Washington, DC 20036
(202) 857-1140

Part I of this workbook is a road map to funding sources, and Part II is an outline of federal laws and rules.

Funding excuses (1991)
By: Golinker, L.
United Cerebral Palsy Associations
1522 K Street,
Suite 1112
Washington, DC 20005
(800) 872-5827

This free memorandum lists 17 common "excuses" offered by four funding programs to deny requests for augmentative and/or alternative communication devices and services in particular, and many other types of assistive technology in general. The four funding programs are Medicaid, special education, vocational rehabilitation, and private insurance. A response is provided for each excuse. The intent is to help in preparing initial applications so that funding will be approved and to provide a strategy for appealing an initial funding denial.

Assistive technology and the Individualized Education Program (1992)
By: RESNA Technical Assistance Project
RESNA Technical Assistance Project
1101 Connecticut Avenue NW, Suite 700
Washington, DC 20036
(202) 857-1140

This product provides information on how to incorporate assistive technology into an IEP for children and youth with disabilities.

Handbook of assistive technology (1992)
By: Church, G., & Glennon, S. (Eds.)
Singular Publishing Co.
4284 41st Street
San Diego, CA 92105-1197
(619) 521-8000

The many faces of funding (1986)
By: Hofman, A.
Phonic Ear, Inc.
250 Camino Alto
Mill Valley, CA 94941
(415) 383-4000

This textbook focuses on funding strategies for communication devices. The information it gives is also applicable to funding for other types of assistive technology aids. It highlights sources of funding on the federal, state, local, educational, and private levels.

Medicaid coverage of AAC **(available late fall 1992)**
By: Golinker, L.
United Cerebral Palsy Associations
1522 K Street, Suite 1112
Washington, DC 20005
(800) 872-5827

This free set of materials explains Medicaid coverage of augmentative and alternative communication through Early Periodic Screening, Diagnostic, and Treatment Services (EPSDT); existing state policies regarding AAC coverage; and model complaints to gain AAC coverage through Medicaid/EPSDT. The materials will be distributed to UCPA affiliates, state Protection and Advocacy Groups, federally funded state Assistive Technology Centers, and state Developmental Disabilities Planning Councils. They may also be obtained by calling UCPA at the number listed above.

Summary of Existing Legislation Affecting Persons with Disabilities (1992)
By: Department of Education
Clearinghouse on Disability Information
U.S. Department of Education
Room 3132 Switzer Building
Washington, DC 20202-2524
(202) 732-1241 (voice or TDD)
(202) 732-1723 (voice or TDD)

This booklet describes many federal laws and programs that affect people with disabilities.

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Databases*

Database resources are large clearinghouses for information on a wide variety of assistive technology, including new and existing hardware, software, and related resources. These databases provide information via on-line electronic networks, floppy disks, CD-ROM, audiocassettes or printed material.

ABLEDATA—Database of Assistive Technology Information
National Rehabilitation Information Center (NARIC)
(operated by Macro International Inc.)
Silver Spring Centre
8455 Colesville Road, Suite 935
Silver Spring, MD 20910
(800) 346-2742
(301) 588-9284

ABLEDATA is an extensive database that contains listings of assistive technology available both commercially and non-commercially from domestic and international manufacturers and distributors. It is an information system that enables people with disabilities and their families to identify and locate devices that will assist them at home, work, school, and in the community; it also serves as a resource for practitioners, researchers, engineers, and advocates in the rehabilitation field.

Some of the areas that can be searched in the database are mobility, seating, communication, and environmental controls. Database citations provide product brand name and generic name, manufacturer name and address, price, and a detailed description of the product. Search results are available in regular print, enlarged print, Braille, audio cassettes, diskettes, CD-ROM, and in Spanish. The ABLEDATA classified service is also available for buying or selling used assistive devices or equipment.

Accent on Information
PO Box 700
Bloomington, IL 61702
(309) 378-2961

A computerized database of product, publication, and related resource information on how to adapt assistive technology equipment. The database contains over 6,000 product entries.

Access/Abilities
PO Box 458
Mill Valley, CA 94942
(415) 388-3250

A database of technology resources for individuals who are physically disabled. The database contains information on services, hardware, and software aids.

Assistive Device Database System
Assistive Device Center
California State University
Sacramento, CA 95819
(916) 278-6422

This database contains information on assistive devices and related resource listings. It focuses on the educational implications of using assistive technology with disabled populations.

Adaptive Device Locator System
Academic Software, Inc.
331 West Second Street
Lexington, KY 40507
(606) 233-2332

This floppy-disk-based system provides descriptions and pictures of assistive devices and lists of sources for products and product information. The system can generate mailing labels and form letters to vendors. The database includes over 600 generic device descriptions, categorized by over 350 functional goal descriptions and cross-indexed with over 300 vendors.

Compuserve
5000 Arlington Centre Blvd.
PO Box 20212
Columbus, OH 43220
(614) 457-8600

The system contains a users' database that contains information on all aspects of technology used by individuals who are disabled.

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DEAFNET
508 Bremer Bldg., 7th and Roberts Streets
St. Paul, MN 55101
(612) 223-5130

DEAFNET is a nonprofit organization that serves technology users who are hearing impaired. It has a nationwide electronic mail service with international links.

ECER
Council for Exceptional Children
1920 Association Drive
Reston, VA 22091-1589
(703) 620-3660

ECER is the ERIC database for technology users who are disabled. The database contains bibliographic information on books, articles, teaching materials, and reports on the education of individuals who are disabled.

Handicapped Education Exchange (HEX)
11523 Charlton Drive
Silver Spring, MD 20902
(301) 681-7372

The HEX database offers resource information on the use of technology with individuals who are disabled. The database contains information on products, organizations, and related information on training and service.

HYPER-ABLEDATA-PLUS
Trace Center Reprint Service
1500 Highland Avenue, S-151 Waisman Center
Madison, WI 53706
(608) 263-6966

The CD-ROM version of the on-line version of ABLEDATA. This disk provides information on over 16,000 assistive technology products. The system also provides pictures and sound samples of many database items, and it has an access system for users who are blind or visually impaired.

National Technology Center
American Foundation for the Blind, Inc.
15 W. 16th Street
New York, NY 10011
(212) 620-2000

The center maintains three database systems: National Technology Database, Evaluations Database, and Research and Development Database. Each database focuses on resources for individuals who are blind or visually impaired and professionals who work with them.

Solutions
Apple Computer, Inc.
20525 Mariani Avenue, MS 43S
Cupertino, CA 95014
(408) 973-2732

The database contains information on hardware, software, organizations, and publications maintained by Apple Office of Special Education Programs. The database can be accessed via SpecialNet or AppleLink.

SpecialNet
2021 K Street, NW, Suite 215
Washington, DC 2006
(202) 835-7300

The largest computer network in the United States devoted exclusively to the information needs of professionals in special education.

Appendix B Resources on Devices & Implementation Strategies

Manufacturers/Vendors[*]

The following is a selected listing of manufacturers/vendors of augmentative communication/education technology. For a more comprehensive list, contact TRACE Research and Development Center, Room S-151 Waisman Center, 1500 Highland Avenue, University of Wisconsin, Madison, WI 53705-2280, (608) 262-6966.

ABLENET
1081 10th Avenue, SE
Minneapolis, MN 55414
(800) 322-0956

Access Unlimited
3535 Briarpark Drive, Suite 102
Houston, TX 77042-5235
(713) 781-7441

Adaptive Communication Systems, Inc.
Box 12440
Pittsburgh, PA 15231
(800) 247-3433

Apple Computer, Inc.
Worldwide Disability Solutions Group
20525 Mariani Avenue
Cupertino, CA 95014
(408) 974-7910

Arroyo & Associates, Inc.
2549 Rockville Centre Parkway
Oceanside, NY 11572
(516) 763-1407

Blissymbolics Communication International
24 Ferrand Drive
Don Mills, Ontario M3C 3N2 Canada
(416) 421-8377

Burkhart Toys
6201 Candle Court
Eldersburg, MD 21784
(410) 795-4561

Canon, Inc.
One Canon Plaza
Lake Success, NY 11042

Communication Aid Manufacturers Association
1101 Connecticut Avenue, NW, Suite 700
Washington, DC 20036
(202) 857-1138

Creative Communicating
2875 Cedar Mill Crossing
Acworth, GA 30101
(404) 975-8256

Creative Teaching Press
PO Box 6017
Cypress, CA 90630
(714) 995-7888

Crestwood Company
6625 N. Sidney Place
Milwaukee, WI 53209
(414) 352-5678

DADA
249 Concord Avenue, Unit 2
Toronto, Ontario M6H 2P4 Canada
(416) 762-0265

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Dickey Engineering
3 Angel Road
North Reading, MA 01864
(508) 664-2010

Don Johnston Developmental Equipment, Inc.
PO Box 639
Wauconda, IL 60084
(800) 999-4660

Dunamis, Inc.
3620 Highway 317
Suwanee, GA 30174
(800) 828-2443

ECHO Speech Corporation
6420 Via Real
Carpinteria, CA 93013
(805) 684-4593

Enabling Technologies Co.
3102 SE Jay Street
Stuart, FL 34997
(407) 283-4817

Facilitated Communication Institute
Syracuse University
311 Huntington Hall
Syracuse, NY 13244-2340
(315) 443-9657

Ginn Publishing
225 West 34th Street, # 1105
New York, NY 10001
(800) 359-5980

IBM Corporation Special Needs Systems
PO Box 1328
Boca Raton, FL 33429-1328
(800) 426-2133 (voice)
(800) 284-9482 (TDD)

Imaginart
PO Box 1868
Idyllwild, CA 92349
(714) 659-5905

Innocomp
33195 Wagon Wheel Drive
Solon, OH 44139
(216) 248-6206

Lekotek
3035 North Druid Hills Road
Atlanta, Ga 30329
(404) 633-3430

Mayer-Johnson Company
PO Box 1579
Solana Beach, CA 92075-1579
(619) 481-2489

Phonic Ear, Inc.
250 Camino Alto
Mill Valley, CA 94941
(800) 227-0735

Poppin and Company
Picsyms Division
Rt. 1, Box 2315
Unity, ME 04988
(207) 437-2746

Prentke Romich Company
1022 Heyl Road
Wooster, OH 44691
(800) 642-8255

R. J. Cooper & Associates
24843 Del Prado, Suite 283
Dana Point, CA 92629
(714) 240-1912

Special Needs Project
(Books about Disabilities and Health for Children and Families)
1482 East Valley, #A-121
Santa Barbara, CA 93108
(800) 333-6867

Sentient Systems Technology, Inc.
5001 Baum Boulevard
Pittsburgh, PA 15213
(800) 344-1SST

TASH (Technical Aids and Systems for the Handicapped), Inc.
91 Station Street
Ajax, Ontario L1S 3H2 Canada
(416) 686-4129

Tiger Communication Systems
155 E. Broad Street, # 325
Rochester, NY 14604
(716) 454-5134

Toys for Special Children
385 Warburton Avenue
Hastings-On-Hudson, NY 10706
(914) 478-0960

Unicorn Engineering, Inc.
5221 Central Avenue, Suite 205
Richmond, CA 94804
(415) 528-0670

Wayne County Intermediate School District
Data Processing/ADAMLAB
33500 Van Born Road
Wayne, MI 48184
(313) 467-1415

Words +, Inc.
PO Box 1229
Lancaster, CA 93584
(800) 869-8521

Wright Group
19201 120th Avenue, NE
Bothell, WA 98011-9512
(800) 523-2371

Xerox Imaging Systems, Inc.
9 Centennial Drive
Peabody, MA 01960
(800) 343-0311

Zygo Industries, Inc.
PO Box 1008
Portland, OR 97207-0838
(800) 234-6006

Print Resources*

Assistive Technology and the Individualized Education Program (1992)
By: RESNA Technical Assistance Project
RESNA TA Project
1101 Connecticut Avenue, NW, Suite 700
Washington, DC 20036
(202) 857-1140

Augmentative and Alternative Communication (1992)
By: Beukelman, D., & Mirenda, P.
Paul H. Brookes Publishing Co.
PO Box 10624
Baltimore, MD 21285-0624
(410) 337-9580

Augmentative Communication: Implementation Strategies (1988)
Eds: Blackstone, S., & Cassatt-James, E.L., and Bruskin, D.
American Speech-Language-Hearing Association
10801 Rockville Pike
Rockville, MD 2120852
(301) 897-5700

Communication Without Speech. A guide for parents and teachers
By: Blumberg, K., & Johnson, H.
The Australian Council for Educational Research Ltd.

The Early Communication Process Using Microswitch Technology (in press)
By: Rowland, C., & Schweigert, P.
Communication Skill Builders, Inc.
3830 E. Bellevue/PO Box 42050
Tucson, AZ 85733
(602) 323-7500

Emergent Literacy Fun (in press)
By: Musselwhite, C.
S.E. AC Conference Publications
2430 11th Avenue North
Birmingham, AL 35234

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* This listing was compiled by the American Speech-Language-Hearing Association (ASHA). It does not attempt to be all-inclusive nor does it imply ASHA endorsement.

The Empowering of Joslin (1992)
By: McNaughton, S.
Sharing to Learn
PO Box 986
Toronto, Ontario L3T 4A5 Canada
(416) 771-1491

Engineering the Preschool Classroom for Interactive Symbol Communication: 18 Months and Above (1992)
By: Goossens', C., & Crain, S.
S.E. AC Conference Publications
2430 11th Avenue North
Birmingham, AL 35234

Enhancing Childrens'Communication: Research Foundations for Intervention (in press)
Eds: Kaiser, A., & Gray, D.
Paul H. Brookes Publishing Co.
PO Box 10624
Baltimore, MD 21285-0624
(410) 337-9580

Handbook of Assistive Technology (1992)
Eds: Church, G., & Glennon, S.
Singular Publishing Co.
4284 41st Street
San Diego, CA 92105-1197

Literacy Learning and Persons with Severe Speech Impediments (1993)
Eds: Yoder, D., & Koppenhaver, D.
In: *Topics in Language Disorders*,
Aspen Publishers, Inc.
7201 McKinney Circle
Frederick, MD 21701
(800) 638-8437

Mini-Grants and Volunteers (1991)
By: Musselwhite, C.
S.E. AC Conference Publications
2430 11th Avenue North
Birmingham, AL 35234

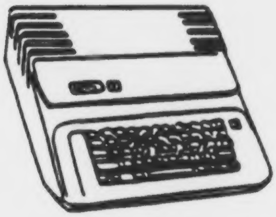
Songbook: Signs and Symbols for Children (1992)
By: Musselwhite, C.
Special Communications
916 W. Castillo Drive
Litchfield Park, AZ 85340
(602) 935-4656

Tangible Symbol Systems: Symbolic Communication for Individuals with Multisensory Impairments (1990)
By: Rowland, C., & Schweigert, P.
Communication Skill Builders, Inc.
3830 E. Bellevue/PO Box 42050
Tucson, AZ 85733
(602) 323-7500

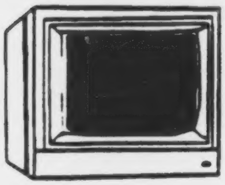
Appendix C Common Types of Assistive Devices

THE COMPUTER SYSTEM

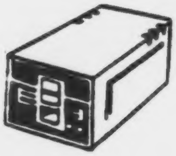
STANDARD COMPONENTS



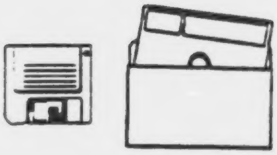
The **COMPUTER** is the processing unit, memory and power supply source of the computer system. It is also referred to as the Central Processing Unit (CPU).



The **MONITOR** provides a visual display of the information being processed by the computer. The information can be words or pictures. Color monitors are suggested for use with preschoolers. The monitor attaches to the computer with a video cable. Unlike televisions, sound is not controlled through the monitor; it provides video output only.



The **DISK DRIVE** is a device that reads the program information stored on a disk. After a disk is inserted and the power turned on, the disk drive loads the program into the computer's memory so that it can be used.



The **DISK** is a storage medium of programmed information. It is the software program that the computer reads and responds to.

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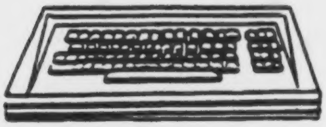
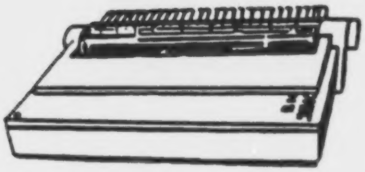
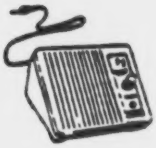
STANDARD COMPONENTS



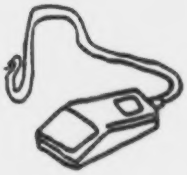
The **KEYBOARD** is the standard input device similar to a typewriter, which sends information to the computer by typing letters, numbers or commands. Keyboards can be built into the computer console (Apple IIe) or attached to the computer with a cable (Apple IIgs).



The **PRINTER** is a device which produces paper or a "hard" copy of the information developed using the computer. Several preschool programs offer a color print-out option; a special printer and color ribbon is required. The printer connects to the computer through an interface card and cable.



The **ECHO SPEECH SYNTHESIZER*** is a device which connects to the computer with an interface card and cabled speaker. It provides speech output for programs specifically designed to work with the Echo.

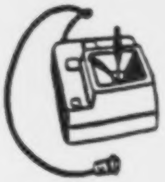


The **MOUSE** is the small device that rolls around on a flat surface next to the computer. When you move the mouse, the pointer on the screen moves correspondingly.

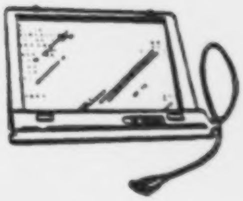
* The Echo Speech Synthesizer is not a standard component of the computer system. However, it is highly recommended to be used with preschoolers, to enhance their software programs.

ALTERNATE INPUT DEVICES

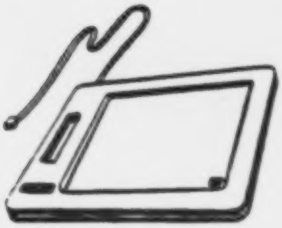
The use of the standard keyboard may not be the best input device for young children with disabilities. Its many key choices may be confusing and distracting. Young children are often nonreaders and nontypists, which makes the keyboard an inappropriate choice. There are several other ways to use the computer which include the following alternate input devices. ONLY software designed for these devices can be used with them.



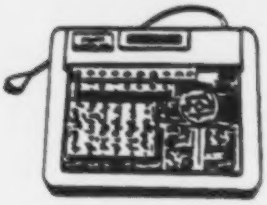
The **JOYSTICK** is a device which sends information to the computer through software designed for its use. It is used in place of the standard keyboard (all computers).



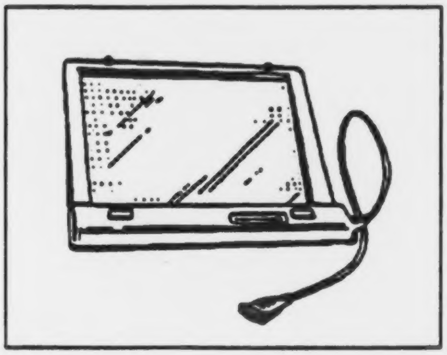
The **TOUCH WINDOW** is a screen that fits over the monitor with velcro strips. Children simply touch an area on the screen to make their selection (IBM, Apple, or Macintosh computers).



The **POWER PAD** is a touch sensitive pad which uses pictured overlays for selection. The overlays are changed with each software program (IBM or Apple II computers).



The **MUPPET LEARNING KEYS** is a touch sensitive pad which can be used as a precursor to the standard keyboard. It includes letters, numbers and function keys organized in a logical way for preschoolers (IBM, Apple or Macintosh computers).

NAME:	**TOUCHWINDOW**
	
MANUFACTURER:	Edmark Corporation P.O. Box 3218 Redmond, WA 98073-3218 (800) 426-0856
DESCRIPTION:	The TouchWindow is a touch sensitive pad or screen designed as an alternative to the standard keyboard. It attaches to the computer monitor with velcro strips. Users simply touch the window to input information into the computer.
REQUIRED SOFTWARE:	Only Apple II software designed for the TouchWindow will work with this device; for IBM or Macintosh computers, mouse driven software programs can be automatically used with the TouchWindow.
CONNECTION:	This board easily plugs into the back of the microcomputer via the 9 pin game I/O port. Serial ports are used with IBM or Macintosh computers.
COMPUTER:	Models are available for Apple, Macintosh and IBM computers.
APPLICATIONS:	The TouchWindow has numerous applications for young children with disabilities as it responds to the lightest touch of a finger or stylus and provides the most direct input.
PHYSICAL ABILITY:	Only a very light touch is required to activate the Touch Window.

TOUCHWINDOW
TROUBLE SHOOTING FOR THE APPLE II

THE TOUCH WINDOW ISN'T WORKING.....

Is the software program that you are using designed for the TouchWindow?

If the program allows for more than one device for input, check the options menu to see if the program is set to work with the TouchWindow.

Is the TouchWindow plugged securely into the 9 pin game I/O port?

STILL NOT WORKING.....

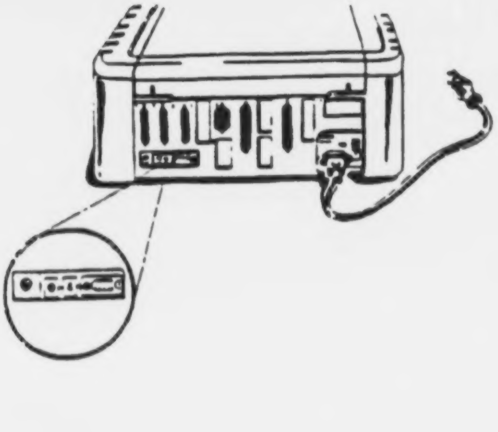
Start the program over again and carefully calibrate the TouchWindow.

Should the window be used as a laptop pad with an overlay for this software program?

Check the documentation of the software program for directions for use.

DESPERATE?

Call Edmark at 1-800-426-0856



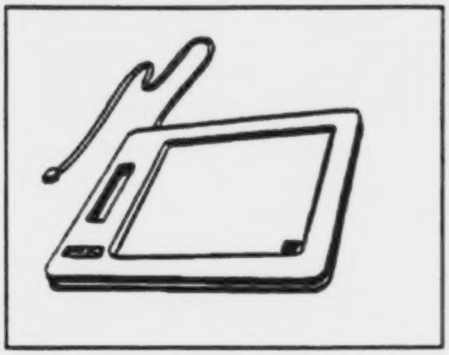
APPLE II CONNECTION

1. Make sure the computer is off
2. Plug into the game port (9 pin connector)
3. Place software disk in the disk drive
4 Turn on the computer

DISCONNECTION

1. Turn off the computer system
2. Wait 5 seconds or longer
3. Remove the TouchWindow from the monitor before you unplug it from the computer

NAME: POWERPAD



MANUFACTURER:

Dunamis Inc.
3620 Highway 317
Suwanee, GA 30174
(800) 828-2443

DESCRIPTION: The PowerPad is a touch sensitive pad designed as an alternative to the standard keyboard. Overlays define press areas necessary to activate special software programs.

REQUIRED SOFTWARE: The PowerPad requires special software. Each program comes with a corresponding overlay. An IBM starter kit is required for the IBM version of the PowerPad. Many of these programs also require the use of the Echo Speech Synthesizer.

CONNECTION: The PowerPad connects to the Apple computer through the 16 pin game I/O port located inside the computer. The use of an extender cable such as the PowerPort, permits the PowerPad to be plugged in externally. The PowerPad connects to the IBM computer through a parallel interface; a PowerPad connector cable is required.

COMPUTER: Models are available for Apple, IBM, VIC and Commodore computers.

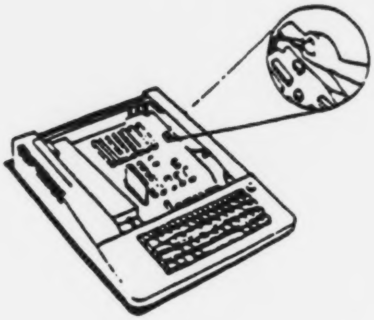
APPLICATIONS: The PowerPad utilizes a variety of overlays which, when coupled with their accompanying software, turn the Power Pad into an alternative keyboard, a communication board, a game board, a piano keyboard, a learning center, or a graphics tablet. A variety of software programs and tool kits have been developed for individuals with disabilities to use the PowerPad.

PHYSICAL ABILITY: A moderate amount of pressure is required to activate the PowerPad.

POWERPAD
TROUBLE SHOOTING FOR THE APPLE II

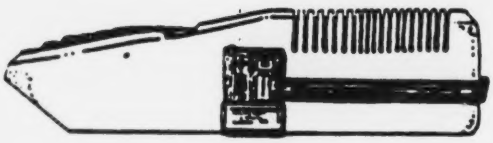
Unable to use the PowerPad? Did you correctly plug in the Pad?

THE POWER PAD ISN'T WORKING.....	Are you using an Apple IIe with numeric keypad? Make sure the computer itself has been modified, or that you are using a PowerPort. Is your PowerPort turned on? Is the 16 pin connector plugged in securely? Try plugging it in again. Is the telephone jack end securely installed into the PowerPad?
STILL NOT WORKING.....	Is the overlay placed correctly on the pad? Is it upside down? Is the overlay that you are using the one that goes with the program disk that you have selected?
DESPERATE?	Call Dunamis at 1-800-828-2443.



CONNECTION

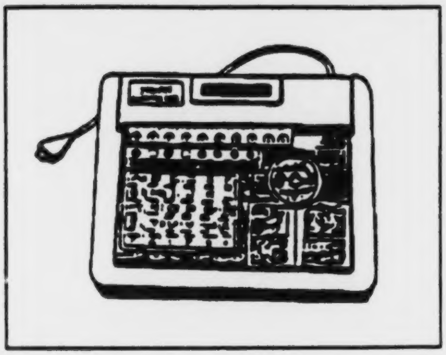
1. Make sure the computer is off
2a. For the Apple computer, plug the 16 pin connector into the Power Port, (an external game port extender). Place pins in connector/ lock-in using lever. Turn the PowerPort on.
2b. Plug the cable into the parallel interface port on the IBM
3. Place software disk in the disk drive
4. Turn on the computer



DISCONNECTION

1. Turn off the computer system
2. Carefully remove 16 pin connector from the PowerPort/parallel port
3. Replace styrofoam immediately onto 16 pin connector

NAME: MUPPET LEARNING KEYS



MANUFACTURER:

Sunburst Communications
101 Castleton Street
PO Box 100
Pleasantville, NY 10570-3498
(800) 628-8897

DESCRIPTION: The Muppet Learning Keys is a touch sensitive keyboard designed especially for use with children. Letters and numbers are arranged in sequence. Other keys (i.e., stop/go) are marked with pictures of popular Muppet characters or colorful graphics.

REQUIRED SOFTWARE: The keyboard works with specially designed educational software that is available from the manufacturer. Several different software programs have been designed to be used with the keyboard.

CONNECTION: The Muppet Learning Keys easily plugs into the back of the Apple computer via the 9 pin game I/O port.

COMPUTER: Models are available for Apple, IBM and Macintosh computers. An adapter box is needed for use with 1 Meg Macintosh computers.

APPLICATIONS: Although this keyboard was originally designed for nondisabled preschoolers, it can be used by young children with disabilities with few or no modifications. Some educators have developed cardboard masks to define specific keyboard areas and to block out distracting keys. Others have developed picture overlays to be used with specially designed software.

PHYSICAL ABILITY: The keys require a moderate amount of pressure within a half-inch square area to be activated.

MUPPET LEARNING KEYS
TROUBLE SHOOTING FOR THE APPLE II

THE MUPPET LEARNING KEYS ISN'T WORKING.....

Is the software program designed to work with the Muppet Learning Keys?

Is the Muppet Learning Keys plugged securely into the game port?

Did you plug in the MLK before you turned on the computer? (If you did not, start over, turn off the computer, plug in the MLK and boot your software.)

Is the input method for the software program selected for use with the MLK? Check the options menu on the software program (Control/T).

Did someone touch the board surface while the program was booting up? If so reboot the program as a touch may cause the program to crash.

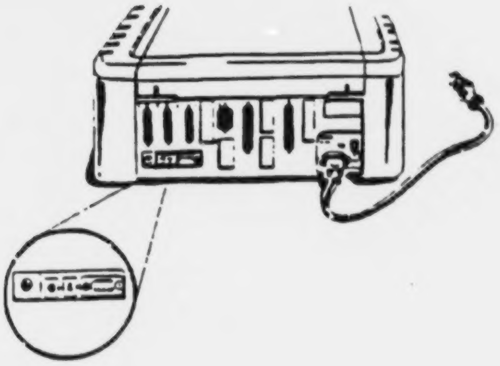
STILL NOT WORKING .....

Check the software program documentation to make sure the program works with the MLK.

Review the manual for the MLK.

DESPERATE?

Call Sunburst at 1-800-628-8897.



CONNECTION

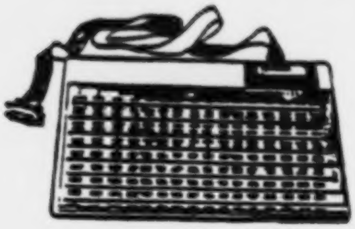
1. Make sure the computer is off
2a. Plug board into the Apple computer's 9 pin game port
2b. Plug board into the IBM computer's parallel interface port
3. Place disk in disk drive
4. Turn on the computer

DISCONNECTION

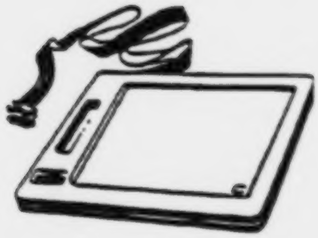
1. Turn off the computer system
2. Unplug board from the game port

KEYBOARD EMULATORS WITH COMPUTER INTERFACES

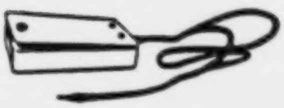
There is a wealth of preschool software designed for the standard keyboard that will not work with the TouchWindow, PowerPad, Muppet Learning Keys or a joystick. In order for preschoolers with disabilities to use these software programs with input devices that are more successful for them, the computer itself must be modified. By adding an interface to the computer, one of the following devices can be used with any software program designed for the keyboard. Computer infaces include: the Adaptive Firmware Card (for the Apple II); DADAEntry (for the IBM); and Ke:nx (for the Macintosh).



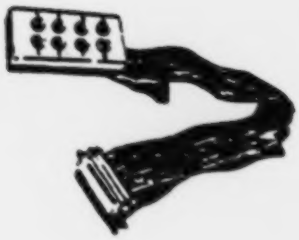
The **UNICORN BOARD** is an expanded keyboard which allows users to customize overlays for individual software programs using pictures toindicate the correct key to select. Press areas can be large or small and positioned anywhere within the surface of the board. The Unicorn 510 keyboard is a smaller version. Other expanded keyboards include the Mini and King key boards by TASH, Inc.



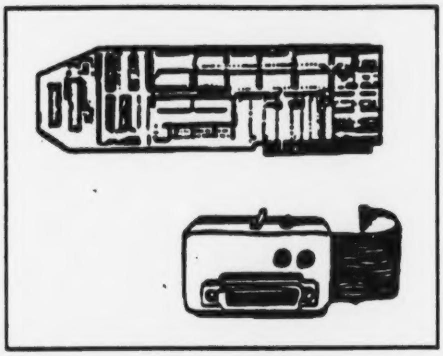
The **FLORIDA EXPANDED KEYBOARD** is a modified PowerPad reconfigured to work as a keyboard. The surface area is smaller than the Unicorn Board, and is less expensive.



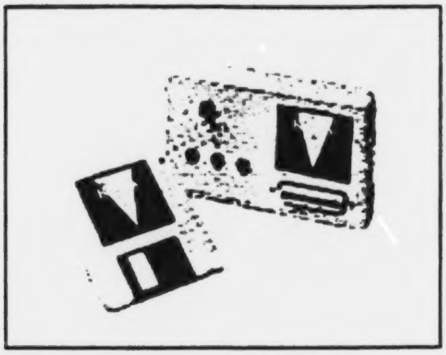
A **SWITCH** is an input device which provides single switch access to software programs. It gives very young children and individuals with disabilities control over software by using only a single movement. Although some software programs are designed to be used with a switch, scans can be used with software requiring more than one key selection. Different scanning methods and customized scanning programs are provided through the interface system.



The **MULTIPLE SWITCH BOX** is a device which allows up to eight switches for direct selection. A scan is not required. Although the eight jack openings can be programmed for use with eight keys for a particular software program, it is recommended that a single program be made which assigns a different function keys for each of the jacks. These can include spacebar, return, arrow keys, etc. Many preschool software programs are limited to these keys.

NAME:	**ADAPTIVE FIRMWARE CARD (AFC)** 
MANUFACTURER:	Don Johnston Developmental Equipment, Inc. P.O. Box 639, 1000 N. Rand Road, Bldg. 115 Wauconda, IL 60084-0639 (800) 999-4660
DESCRIPTION:	The Adaptive Firmware Card system consists of an internal printed circuit card, cable and an I/O box. The system allows a computer to be accessed transparently by any one of 16 special input methods for people who cannot use the standard keyboard or who find an alternate input method more efficient. To use the AFC system, you need an input device (expanded keyboard, switch, etc.) purchased separately.
REQUIRED SOFTWARE:	The first time you install the Adaptive Firmware Card, you must use the software included with the AFC which sets up the system and tells the computer which input device you will use and its special input method. This set up allows the user to run commercial software with special input methods and rates.
CONNECTION:	The circuit card fits into one of the expansion slots inside the computer. No technical expertise is required for installation. The I/O box mounts on the side of the computer. The switch or other input device (supplied by the user) plugs into it.
COMPUTER:	The model G12 card is designed for the Apple IIe with 64K; the model G32e is for the Apple IIe with 128K and the Apple IIgs.
APPLICATIONS:	The AFC allows transparent access to any software. Ther user can select a variety of input methods with or without speech feedback. The device has the ability to retain words, phrases, and macros.
PHYSICAL ABILITY:	Depending on the access device used, almost any degree of pressure can be selected.

NAME: Ke:nx



MANUFACTURER:

Don Johnston Developmental Equipment, Inc.
PO Box 639
1000 N. Rand Road, Bldg. 115
Waudonda, IL 60084-0639
(800) 999-4660

DESCRIPTION: Ke:nx consists of an interface box and system software. Ke:nx allows a computer to be accessed transparently by any one of several special input methods for people who cannot use the standard keyboard or find an alternate input method more efficient. To use Ke:nx, you need an adapted input device (such as an expanded keyboard or switch) which you must purchase separately.

REQUIRED SOFTWARE: Ke:nx allows the user to run commercial software with alternative input methods. Special system software is included with Ke:nx and must be installed in the system folder.

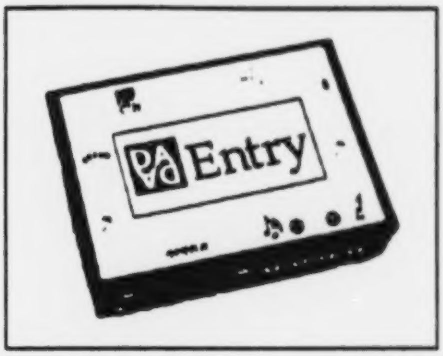
CONNECTION: Ke:nx plugs into the ADB port on the keyboard. The mouse is then plugged into the Ke:nx interface box.

COMPUTER: Ke:nx will operate on any Macintosh except the Mac 512 or the Mac Plus.

APPLICATIONS: Ke:nx allows transparent access to any software. The user can select a variety of input methods with or without speech feedback. The device has the ability to retain words, phrases, and macros.

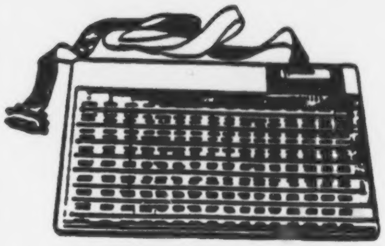
PHYSICAL ABILITY: Depending on the access device used, almost any physical ability can be accommodated.

NAME:	**DADAEntry**



MANUFACTURER:	TASH Unit 1, 91 Station Street Ajax, Ontario L1S 3H2 CANADA (416) 686-4129
DESCRIPTION:	The DADAEntry is an interface box which plugs into the serial port of an IBM or compatible computer. It allows the computer to be accessed by a variety of input methods with any software program. Special software tells the computer which input device you will use and its special input method. The DADAEntry allows for a variety of input methods including expanded keyboards, scanning and Morse Code.
REQUIRED SOFTWARE:	Special software comes with the DADAEntry. Once it is installed in the system, any software can be used with the alternative input method selected.
CONNECTION:	The DADAEntry plugs into the serial port of an IBM or compatible computer. A switch or other input device plugs into the DADAEntry box.
COMPUTER:	Available for IBM and compatible computers.
APPLICATIONS:	The DADAEntry allows transparent access to most software.
PHYSICAL ABILITY:	Depending on the access device used, almost any physical ability can be accommodated.

NAME: **UNICORN EXPANDED KEYBOARD**



MANUFACTURER:
Unicorn Engineering, Inc.
5221 Central Avenue, Suite 205-A
Richmond, CA 94804
(800) 899-6687

DESCRIPTION: The Unicorn Expanded Keyboard is an alternative to the standard keyboard. The 128 key areas can be redefined to create larger, but fewer key areas, so as to accommodate the physical capabilities of the user. When using commercial software with special software and a speech synthesizer, each key area can output a spoken message. Two sizes are available.

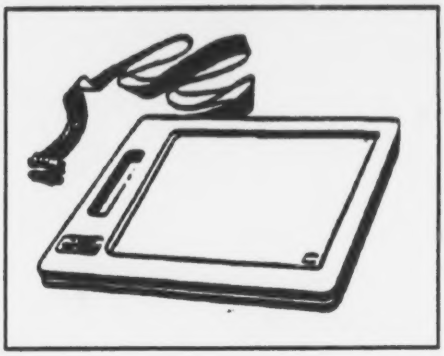
REQUIRED HARDWARE: To operate the Unicorn, the Apple user needs an Adaptive Firmware Card; the Macintosh user needs Ke:nx, and the IBM user needs a DADAEntry.

CONNECTION: This board plugs into the Adaptive Firmware Card, DADAEntry or Ke:nx.

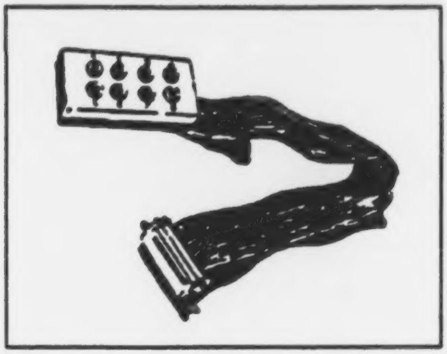
COMPUTER: The same model may be used with Apple, Macintosh and IBM computers.

APPLICATIONS: The Unicorn Expanded Keyboard allows complete keyboard access to individuals who have difficulty with the standard keyboard. Software programs can be activated by this input device which has the capability to group keys in order to enlarge the size of a press area, program active keys in a single section of the board (i.e., left side only) for individuals with limited motor use and permit speech output of user defined messages.

PHYSICAL ABILITY: A moderate amount of touch is required to activate the press areas. The Unicorn Expanded Keyboard has an adjustable response time; the user can set the rate of activation of the keys. Keyguards are available through the vendor.

NAME:	**FLORIDA EXPANDED KEYBOARD** 
MANUFACTURER:	Exceptional Computing 450 N.W. 58th Street Gainesville, FL 32607 (904) 331-8847
DESCRIPTION:	The Florida Expanded Keyboard is a fully programmable expanded keyboard with up to 128 touch sensitive keys. It must be used with a special interface. Six overlays are provided (128, 64, 32, 16, 2, and QWERTY standard keyboard overlays) as well as setup disks. This keyboard offers an affordable option to users who need an expanded keyboard. It can also be used as a talking communication board.
REQUIRED HARDWARE AND SOFTWARE:	To operate the Florida Expanded Keyboard, the Apple user first needs to have an Adaptive Firmware Card installed in the computer. IBM systems require a DADAEntry, while Macintosh computers require the Ke:nx. Any commercial software can be used.
CONNECTION:	This board easily plugs into the I/O box which is part of the Adaptive Firmware Card, Ke:nx, or DADAEntry system .
COMPUTER:	The same model may be used with Apple, Macintosh, and IBM computers.
APPLICATIONS:	The Florida Expanded Keyboard allows complete keyboard access to individuals who have difficulty with the standard keyboard. All software programs can be activated by this device. Individual keys may be defined singularly or in groups via the included software. It can be programmed for a talking expanded keyboard or a talking word board.
PHYSICAL ABILITY:	The amount of touch pressure can be determined through the interface system.

NAME: MULTIPLE SWITCH BOX



MANUFACTURER:
Don Johnston Developmental Equipment, Inc.
P.O. Box 639
1000 N. Rand Road, Bldg. 115
Wauconda, IL 60084
(708) 526-2682
(800) 999-4660

DESCRIPTION: The Multiple Switch Box (MSB) allows you to connect up to eight switches to the computer as a direct select input method. Each switch is defined as if it were a key on the keyboard. The MSB connects to the Adaptive Firmware Card or Ke:nx.

REQUIRED SOFTWARE AND HARDWARE: The Multiple Switch Box requires no special software. To be used independently it requires any software with 8 or less keys. The Multiple Switch Box must be used with the Adaptive Firmware Card or Ke:nx.

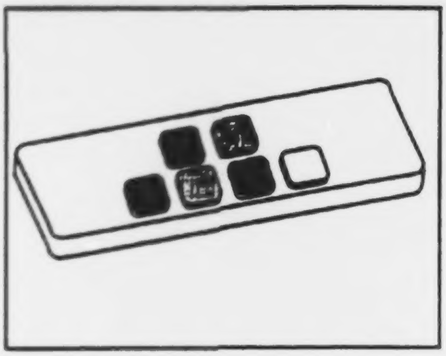
CONNECTION: The Multiple Switch Box connects to the computer through the I/O box of the Adaptive Firmware Card or Ke:nx.

COMPUTER: Models are compatible with Apple and Macintosh computers.

APPLICATIONS: The Multiple Switch Box allows children with disabilities to bypass the standard keyboard and use switches to control software. The use of a switch to directly activate software can give children equal access to the computer. It's an ideal tool to facilitate cooperative learning.

PHYSICAL ABILITY: Some degree of physical ability is required to activate a switch. Because any switch works with the MSB, the degree and amount of physical ability will vary. It is dependent upon the specific switch selected for the child.

NAME: MATCHBOX KEYBOARD COVERS



MANUFACTURER:

Don Johnston Developmental Equipment, Inc.
P.O. Box 639
1000 N. Rand Road, Building 115
Wauconda, IL 60084
(800) 999-4660

DESCRIPTION: MatchBox keyboard covers, with either 6 or 10 keys, are designed to snap directly over the Apple IIgs keyboard. Used with the Adaptive Firmware Card, they allow ready access to many software programs. The addition of Clear Keys and set up software allows the user to customize the keyboard, or to use MatchBox as a beginning communication board.

REQUIRED SOFTWARE AND HARDWARE: To utilize MatchBox keyboard covers, the user must have an Adaptive Firmware Card installed in the Apple IIgs computer.

CONNECTION: MatchBox keyboard covers snap directly over the regular Apple IIgs keyboard.

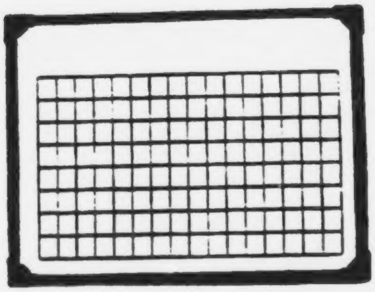
COMPUTER: The keyboard covers are designed for use with the Apple IIgs computer only. They are compatible with the Adaptive Firmware Card Model G32/G32e.

APPLICATIONS: MatchBox keyboard covers allow children with disabilities to access software programs using either 6 or 10 large, brightly colored keys.

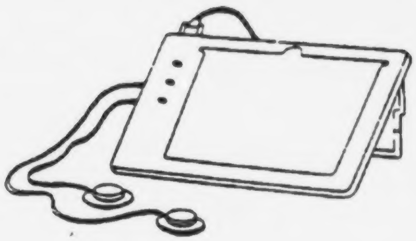
PHYSICAL ABILITY: MatchBox keyboard covers require the same amount of pressure as pressing single keys on the standard keyboard.

KEYBOARD EMULATORS WITHOUT COMPUTER INTERFACES

The following keyboards can be used as expanded keyboards (i.e., Unicorn Board, TASH King/Mini Keyboards), but require no additional computer interface such as the Adaptive Firmware Card, Ke:nx, or DADAEntry. They plug directly into any computer system. This is a cost effective alternative for individuals who use only expanded keyboards.



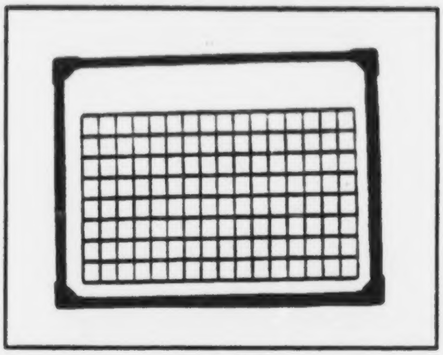
The **CONCEPT KEYBOARD** can be used along with or in place of the standard keyboard, and does not require an additional interface. Although four overlays are included which will work with many software programs, the board is fully programmable. The overlay manager software allows the user to define all keypress areas – press areas may be large or small and positioned anywhere within the surface of the board. Two Concept Keyboards can be used with the same computer at the same time; each one is independently programmable – so several individuals with different needs can learn together.



INTELLIKEYS, The Smart Keyboard, is another alternative input device that plugs directly into the keyboard port of the computer. Equipped with several overlays that the computer automatically adjusts for, the "smart" keyboard has many built in features for individuals with disabilities. In addition to making adjustments in keyboard responsiveness, repeat settings, mouse speed, etc., you can enhance the accessibility of Intellikeys by using it with switches.

CONCEPT KEYBOARD

NAME:



MANUFACTURER:

Exceptional Computing
450 NW 58th Street
Gainesville, FL 32067
(940) 374-8847

DESCRIPTION:

The Concept Keyboard is a fully programmable alternative to the standard keyboard. The user can define up to 128 key areas, either singly or in groups of any size. The Concept Keyboard plugs directly into Apple II, Macintosh and IBM/compatible computers; no computer interface is necessary.

REQUIRED SOFTWARE AND HARDWARE:

No additional hardware or software is necessary. Overlay manager utilities software is included with general setups defined.

CONNECTION:

The Concept Keyboard plugs directly into the serial port on the back of Macintosh and IBM computers. A Concept Interface card is included with the Apple system. No technical expertise is necessary to install the Concept Keyboard.

COMPUTER:

Concept Keyboards are available for IBM, Macintosh and Apple II computers.

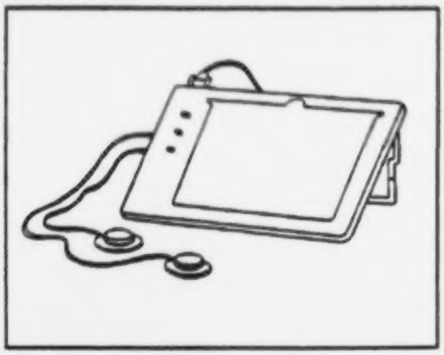
APPLICATIONS:

The Concept Keyboard allows complete keyboard access to individuals who have difficulty with the standard keyboard without the need for an additional computer interface. Two keyboards can be used with the same computer at the same time – each independently programmable – so individuals with varying needs can learn together. When used with a speech synthesizer, the Concept Keyboard "talks." The keyboard activates all software programs.

PHYSICAL ABILITY:

A moderate amount of pressure is requires to activate the Concept Keyboard.

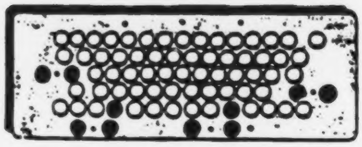
NAME:	**INTELLIKEYS, The Smart Keyboard**



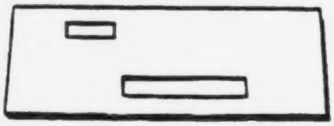
MANUFACTURER:	Unicorn Engineering, Inc. 5221 Central Avenue, Suite 205 Richmond, CA 94804 (800) 899-6687 (510) 528-0670
DESCRIPTION:	Intellikeys, the Smart Keyboard, is an alternative to the standard keyboard. It plugs directly into the keyboard port of the computer and offers the user a host of built in access features that include touch, repeat, shift, and mouse functions. Unicorn Engineering includes several overlays that are automatically recognized by the "smart" keyboard. Some software publishers distribute custom overlays that work with Intellikeys and their programs.
REQUIRED SOFTWARE AND HARDWARE:	No additional hardware or software is necessary. The same keyboard requires separate cable for different computers.
CONNECTION:	Intellikeys plugs directly into the keyboard port of most computers. Apple IIe requires an Intellikeys IIe card.
COMPUTER:	The same model is used with Apple II, Macintosh, and IBM computers.
APPLICATIONS:	Intellikeys allows complete keyboard access to individuals with disabilities without the need for an additional computer interface. The seven overlays provided with the keyboard include alphabet and number overlays for early learning, arrows overlay to run most educational programs, and basic writing and standard keyboard layout overlays. A set up overlay allows instant access to many features that meet the visual, cognitive, and physical needs of individuals with disabilities.
PHYSICAL ABILITY:	A moderate amount of pressure is required to activate Intellikeys.

KEYBOARD MODIFICATIONS

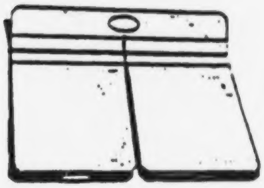
You may want to try modifying the standard keyboard to make it more successful for use by preschoolers with disabilities. The use of stickers to highlight important keys is one low cost suggestion. Other modifications include:



KEYGUARDS are plastic overlays with finger-sized holes that are placed over a keyboard. This prevents accidental key pressing. Keyguards are designed for specific keyboards (IBM, Macintosh, Apple IIe and IIgs) as well as for expanded keyboards.

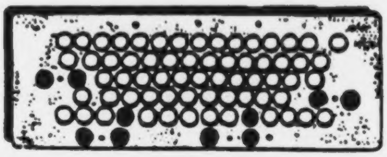


Cardboard **MASKS** are placed over keyguards and are made to show only the keys that work individual software programs.



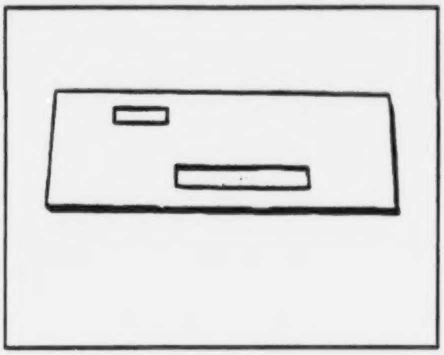
KEYBOARD COVERS are also placed over the standard Apple IIe keyboard and can be used with software which requires only two key selections.

NAME:	**KEYGUARD**



MANUFACTURER:	TASH, Inc. Unit 1, 91 Station Street Ajax, Ontario, Canada L1S 3H2 (416) 686-4129
DESCRIPTION:	Keyguards are plastic overlays with finger-sized holes that correspond to the keys on a keyboard. Users can slide their hands over the surface without accidentally activating the keys. Some keyguards have a latch device to hold certain keys down while another is pressed (needed for shift, control, etc).
REQUIRED SOFTWARE:	No special software is required.
CONNECTION:	Keyguards attach to the computer with plastic grips or lock fasteners. Keyguards must be ordered for the specific key boards that will be used.
COMPUTER:	TASH designs keyguards for Apple, Macintosh and IBM computers. Several other vendors supply keyguards.
APPLICATIONS:	Placing a cardboard mask over the keyguard helps to define specific keys needed for program input.
PHYSICAL ABILITY:	Keyguards can assist persons with physical disabilities to be more accurate.

NAME: CARDBOARD MASKS



MANUFACTURER: Home made adaptation.

DESCRIPTION: Cardboard masks are made using poster board or some other heavy paper board. Holes are cut in the cardboard to expose only the individual keys that a student will need to use. The holes can be cut for a particular computer program or to accommodate the needs of an individual child. Cardboard masks are sometimes placed over the top of a keyguard to limit the number of errors a young child makes.

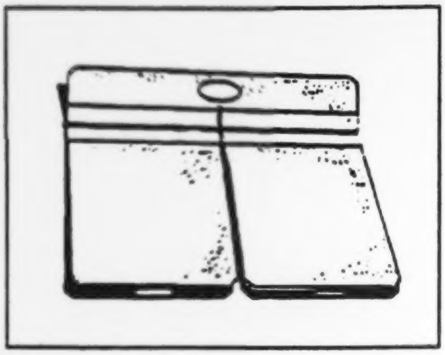
REQUIRED SOFTWARE: Any software that requires, or can be limited to, only a few keys on the keyboard.

CONNECTION: The cardboard mask can be attached to the keyboard with velcro.

APPLICATIONS: A keyboard mask limits the number of keys a child can access. This reduces the possibility of errors and reduces the possibility that the child will press a key by accident. The keyboard mask is used to limit visual stimuli, as the entire keyboard may confuse a young child.

PHYSICAL ABILITY: A keyboard mask does not alter the amount of pressure on single keys on the keyboard.

NAME:	**KEYBOARD COVER**

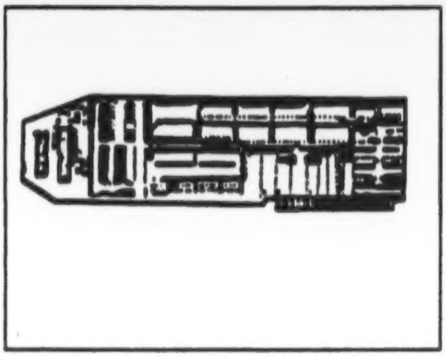


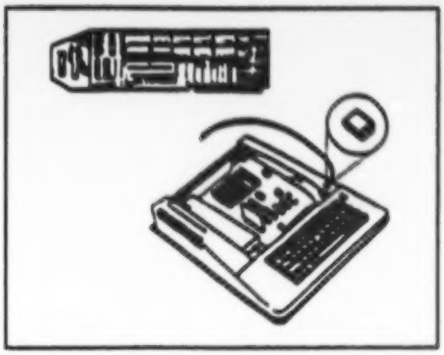
MANUFACTURER:	Toys for Special Children 385 Warburton Avenue Hastings-on-Hudson, NY 10706 (800) 832-8697
DESCRIPTION:	Plastic keyboard covers are placed over the standard keyboard. Rubber bumpers are provided which adhere to the keys. Pressing the left side of the cover activates the key with the bumper that lies under it, as a press on the right side activates the key on that side.
REQUIRED SOFTWARE:	Any software that requires or can be limited to two keys on the keyboard.
CONNECTION:	The keyboard cover attaches to the keyboard with velcro.
COMPUTER:	For Apple IIe only.
APPLICATIONS:	The keyboard cover gives the child a large target press area. Input can be limited to two keys for computer introduction.
PHYSICAL ABILITY:	The keyboard cover requires the same amount of mild pressure as pressing single keys on the keyboard.

COMPUTER ENHANCEMENTS

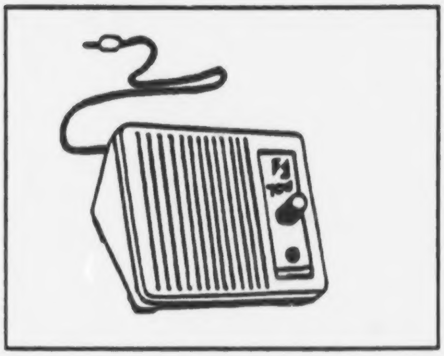
Several peripherals used with the computer act to enhance the input and output capabilities of the computer. The computer is designed to be compatible with these enhancements. Those suggested for use with preschoolers with disabilities include the following:

SUPER SERIAL CARD	A circuit card added to the Apple computer to act as an interface for printers, modems, robots and other computers. When used as a printer interface, the Super Serial Card works with software designed with printer options.
FINGER PRINT CARD	A printer interface system which, when added to the Apple II computer, allows a print out of any text or graphics on a single monitor screen. Software programs not designed with printing options, can be printed using this system. This printer interface system consists of circuit card installed in the computer, an external push button and wire, and a printer connector cable.
ECHO SPEECH SYNTHESIZER	A circuit card and speaker system which allows software designed for its use to 'talk'. With the circuit card inserted in the computer, the external speaker box is connected to the card with a cable. With Echo model IIb, a jumper wire allows all computer sound to be heard through the speaker box which includes a volume control knob.

NAME:	**SUPER SERIAL CARD**
	
MANUFACTURER:	Apple Computer, Inc. 20525 Mariani Avenue MS36-M Cupertino, CA 95014 (408) 973-2732
DESCRIPTION:	The Super Serial Card (SSC) is an internal interface system that can provide a two way interface between the Apple computer and printer. Its operation is controlled directly from the keyboard. It simultaneously transmits and receives data in response to software commands. It consists of two parts: a circuit card and a printer connector cable.
REQUIRED SOFTWARE:	Only software that has been designed with printing options will work with the Super Serial Card.
CONNECTION:	The SSC fits into one of the expansion slots inside of the computer. No technical expertise is required for installation. A cable connects the printer to the card.
COMPUTER:	Models are available for all Apple computers.
APPLICATIONS:	For software that has printing options such as *Print Shop* or word processing programs, this is ideal. The SSC must be inserted inside the computer before it will print. It can also link your computer to other devices such as robots, terminals, communication devices and other computers.
PHYSICAL ABILITY:	The same physical ability that it would require for any program for the keyboard.

NAME:	**FINGER PRINT INTERFACE**
	
MANUFACTURER:	Thirdware 4747 N.W. 72nd Avenue Miami, FL 33166 (305) 592-7522
DESCRIPTION:	Finger Print is an internal printer interface system for Apple II computers which gives the user the ability to output whatever appears on a single monitor screen to a printer, with one push of a button. It consists of three pieces: a circuit card, a push button (with wire), and a printer connector cable.
REQUIRED SOFTWARE:	No special software is required.
CONNECTION:	The circuit card fits into one of the expansion slots inside the computer. No technical expertise is required for installation. The external push button attaches to the card and can be placed on the front of the keyboard. The ImageWriter II printer provides color copies.
COMPUTER:	Models are available for Apple II computers.
APPLICATIONS:	The ability to capture images from the screen to the printer has special benefits when working with young children with disabilities. Children delight in being able to take a copy home of what they have created on the computer.
PHYSICAL ABILITY:	The key requires a light amount of pressure within a half inch press area to be activated.

NAME: ECHO SPEECH SYNTHESIZER



MANUFACTURER:

Street Electronics Corporation
6420 Via Real
Carpinteria, CA 93013
(805) 684-4593

DESCRIPTION: The Echo Speech Synthesizer is an internal printed circuit card and speaker system which brings speech output to a computer. It has two voice modes: a limited vocabulary, digitized female voice; or an unlimited vocabulary, robotic voice. The board can also generate sound and music.

REQUIRED SOFTWARE: Only software that has been designed for the Echo Speech Synthesizer will actually talk. If the card is not placed in the computer, software designed to talk will operate, but the user will not hear the voice or sound. The Echo IIb permits all computer sounds to emit through the attached speaker which comes with volume control and headphone jack.

CONNECTION: The circuit card fits into one of the expansion slots inside the computer. No technical expertise is required for installation. The speaker plugs into the card. The Echo LC, for the Mac LC, connects via the modem port.

COMPUTER: Models are available for Apple, IBM, and Macintosh computers.

APPLICATIONS: Speech synthesis enhances software and has many applications for the young user with disabilities, including reading directions, giving verbal prompts, and providing feedback and motivation. Its text-to-speech program gives the computer an unlimited vocabulary.

PHYSICAL ABILITY: No physical ability is required to use this device.

Appendix D Popular Publishers/Vendors of Special Education Software

SOFTWARE PUBLISHERS

Activision, Inc.
P.O. Box 7287
Mountainview, CA 94039

American School Publishers
11 W. 19th Street
New York, NY 10011
(212) 337-6033

Bantam Electronic Publishing
666 Fifth Avenue
New York, NY 10103
(800) 223-6834

Baudville
5380 52th Street, S.E.
Grand Rapids, MI 49508
(616) 698-0888

Jana Birch
3912 LaJolla Village Drive
LaJolla, CA 92037
(619) 452-9187

BOCES II Special Education
Microcomputer Resource Center
Sherwood Corporate Center
15 Andrea Drive
Holbrook, NY 11741

Wm. K. Bradford Publishing Company
310 School Street
Acton, MA 01720
(508) 263-6996

Broderbund Software, Inc.
17 Paul Drive
San Rafael, CA 94903-2101
(800) 521-6263

The Byte Works
4700 Irving Blvd., N.W., Suite 207
Albuquerque, NM 87114
(505) 898-8183

CBS Software
One Fawcett Place
Greenwich, CT 06836
(800) CBS-ASK4

Compu-Tech
78 Olive Street
New Haven, CT 06511
(800) 488-3224

R.J. Cooper and Associates
24843 Del Prado, Suite 283
Dana Point, CA 92629
(714) 240-1912

Davidson and Associates, Inc.
3135 Kashiwa Street
Torrance, CA 90505
(800) 556-6141

DIL International, Inc.
2025 Lavoisier Street, Suite 180
Sante-Foy, Quebec G1N 4L6
CANADA
(418) 687-9788
Telex: 051-3786
FAX: (418) 694-9679

DLM Teaching Resources
One DLM Park
Allen, TX 75002
(214) 248-6300
(800) 527-5030

Don Johnston Developmental
Equipment, Inc.
1000 N. Rand Road, Building 115
P.O. Box 639
Wauconda, IL 60084
(708) 526-2682
(800) 999-4660

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Dunamis, Inc.
3620 Highway 317
Suwanee, GA 30174
(800) 828-2443

Dynacomp, Inc.
178 Phillips Road
Webster, NY 14580
(716) 671-6167
(800) 828-6772

Edmark Corporation
P.O. Box 3903
Bellevue, WA 98009
(800) 426-0856

Exceptional Children's Software
P.O. Box 487
Hays, KS 67601
(913) 625-9281

The Great Wave Software
5353 Scotts Valley Drive
Scotts Valley, CA 95066
(408) 438-1990

Hartley Courseware, Inc.
P.O. Box 431
Dimondale, MI 48821
(800) 247-1380

Hi-Tech Expressions
584 Broadway
New York, NY 10012
(800) 447-6543

Laureate Learning Systems, Inc.
110 East Spring Street
Winooski, VT 05404
(802) 655-4755

Lawrence Productions, Inc.
1800 South 35th Street
Galesburhg, MI 49053-9687

The Learning Company
6493 Kaiser Drive
Fremont, CA 94555
(800) 852-2255

Learning Technologies, Inc.
13633 Gamma Road
Dallas, TX 75244
(214) 385-2351
(800) 238-4277

Marble Soft
21805 Zumbrota, N.E.
Cedar, MN 55011
(612) 434-3704

Millenium
24 East 22nd Street
New York, NY 10020
(212) 674-0040

Mindplay
3130 N. Dodge Boulevard
Tucson, AZ 85716
(800) 221-7911

Mindscape
Ed. Div. Dept. C
1345 Diversey Parkway
Chicago, IL 60062
(312) 525-1500

Peal Software
P.O. Box 8188
Calabasa, CA 91372
(818) 833-7849

Pelican Software, Inc.
768 Farmington Court
Farmington, CT 06032
(800) 822-DISK

Polarware
1055 Paramount Pkwy., Suite A
Batavia, IL 60510
(312) 232-1984

Project ACTT
27 Horrabin Hall
Western Illinios University
Macomb, IL 61455
(309) 298-1634

Saddleback Graphics
3621 W. MacArthur Boulevard
Suite 119
Santa Ana, CA 92704
(714) 540-4062

Scarborough Systems, Inc.
55 S. Broadway
Tarrytown, NY 10591
(914) 332-4545

Scholastic, Inc.
(212) 505-3561

Simon and Schuster, Inc.
Computer Software Division
1230 Avenue of the Americas
New York, NY 10020
(212) 860-0300
(800) 847-7078

Spinnaker Software
201 Broadway
Cambridge, MA 02139
(617) 494-1200

Springboard Software, Inc.
7807 Creekridge Circle
Minneapolis, MN 55435
(612) 944-3912

Stone and Associates
7910 Ivanhoe Avenue, Suite 319
LaJolla, CA 92037
(800) 748-5523

Sunburst Communications, Inc.
39 Washington Avenue
Pleasantville, NY 10570
(914) 769-5030
(800) 628-628-8891

Tom Snyder Productions
90 Sherman Street
Cambridge, MA 02140
(617)874-4433

UCLA/LAUSD Microcomputer Project
1000 Veteran Avenue
Room 23-10
Los Angeles, CA 90024
(213) 825-4821

Weekly Reader Software/
Optimum Resource, Inc.
10 Station Place
Norfolk, CT 06058
(800) 327-1473

Public Domain Special Education Software Caatalogs:

Center for Adapted Technology
Colorado East Seals
5755 W. Alameda
Lakewood, CO 80226
(303) 233-1666

Connecticut Rehabilitative Engineering
Center
The Institute for Human Resource
Development
78 Eastern Boulevard
Glastonbury, CT 06033
(203) 659-1166
(203) 657-9954

Technology for Language & Learning
Special Education Public Domain Project
P.O Box 327
East Rockaway, NY 11518-0327
(516) 625-4550

STANDARD KEYBOARD SOFTWARE SUGGESTIONS

SOFTWARE NAME	PUBLISHER	AGES	PROGRAM DESCRIPTION	COMMENTS	INPUT PERIPHERALS
Animal Photo Fun	DLM	4-up	Six games to introduce a child to animals and their habitats.	Games increase in concept level and complexity as a child moves through them. Written format for menu.	
Colors And Shapes	Hartley	3-5	Programs include matching colors, shapes or objects, depending on picture menu and level chosen from picture menu.	Documentation gives suggestions for related activities.	
Concentrate! On Words and Concept Words	Laureate Learning Systems	3-up	Program is designed to exercise short term memory. Players try to find pairs based on word identification by function or word association. Game boards may contain 3, 4, or 6 picture pairs.	Game-like program reinforces language skill areas. Echo Speech Synthesizer required.	Switch TouchWindow
Color Find	Exceptional Children's Software	3-up	Drill and practice program for color recognition and discrimination.	Echo Speech Synthesizer prompts the child. Choose from 1-9 colors.	
Comparison Kitchen	DLM	3-8	Uses bakery goods to teach comparison concepts, object discrimination by color, size, and shape.	Responses are immediate and motivating. Scanning box may be difficult to perceive.	
Cotton Tales	Mindplay	4-8	An early word processing program using pictures and words for successful expression.	Pictures and stories may be printed. Placement of graphics is limited.	

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SOFTWARE NAME	PUBLISHER	AGES	PROGRAM DESCRIPTION	COMMENTS	INPUT PERIPHERALS
Curious George Goes Shopping	DLM	4-8	An interactive story features Curious George in shopping activities which include classifying store items into categories. Two levels of difficulty enhance the challenge.	Having the spacebar as the only access key allows preschoolers to focus on the story and its concepts.	
Curious George In Outer Space	DLM	4-8	An interactive story and three games with two skill levels provide size concept activities with Curious George.	Graphics and sound using this favorite character are motivating for preschoolers. Adult help necessary for nonreader.	
Curious George Visits The Library	DLM	4-8	Program provides an interactive story and three games depicting George and reinforcing spatial concepts.	Graphics and sound using this favorite chararcter are motivating for preschoolers. Adult help necessary for nonreader.	
Dr. Peet's Talk/Writer	Hartley	2-6	This two disk program provides activities from letter recognition to simple word processing using the Echo Speech Synthesizer and large letter display.	Echo Speech Synthesizer encourages and reinforces independent use. Special options for visually impaired.	
Early Learning Series:					
Early Learning I	Marblesoft	3-6	Four programs introduce and develop shape, color, number and letter concepts in a sequential manner.	With choice of several alternate input devices, programs meet individual needs. Echo Speech Synthesizer cues, corrects and rewards the student. Programs can be modified to accept yes/no response, and work on several levels of difficulty.	Joystick Touch Window Power Pad Introvoice Hand-Controllers Light Pen Keyboard-Overlays
Early Learning II	Marblesoft	4-8	Number and addition sequence skills are strengthened through a developmental sequence of programs.		
Early Learning Mix 'N' Match	Marblesoft	3-7	Classification, discrimination and patterning skills are developed through various levels of difficulty.		
Easy Street	Mindplay	4-8	Shopping adventure program to associate objects with storefronts; must find objects on shopping list. Echo Speech Synthesizer cues and rewards selection.	Objects and stores can be selected through Challenge Upgrade. Many options available for customization.	

SOFTWARE NAME	PUBLISHER	AGES	PROGRAM DESCRIPTION	COMMENTS	INPUT PERIPHERALS
Elf ABC	Public Domain	3-up	Simple ABC and number program. Key press results in picture and music. Wait for music to stop; press another key.	Exploratory program with a "wait until" feature.	
Explore-A-Software:					
Rosie The Counting Rabbit	Wm. K. Bradford	5-7	This series is designed to stimulate and develop reading and writing skills. Programs allow the manipulation of background scenery, character addition with animation and text writing directly on the screen. Three print options are also included.	This creative and open-ended series provides a vehicle for exploring story book design and development. Easy to use picture menus give even the very young child control over this program.	Mouse Joystick Koala Pad
Just Around the Block	Wm. K. Bradford	5-7			
The Bald-Headed Chicken	Wm. K. Bradford	5-7			
Where Did My Toothbrush Go?	Wm. K. Bradford	4-up			
What Makes A Dinosaur Sore?	Wm. K. Bradford	4-up			
Explore-A- Classic: The Three Little Pigs	Wm. K. Bradford	3-up	The Explore-A-Classic program consists of three parts: Story Teller, Story Maker and Activities. Story Teller is similar to a pop-up book that is partially animated. Story Maker helps children tell stories and begin to write their own. Activities give children further opportunities to practice working with word concepts, counting, labeling, classification and construction tasks.	Great program! Allows creative interactions within favorite stories.	Mouse Joystick Koala Pad

SOFTWARE NAME	PUBLISHER	AGES	PROGRAM DESCRIPTION	COMMENTS	INPUT PERIPHERALS
Facemaker, Golden Edition	Spinnaker	3-8	Children can construct and animate a variety of characters selecting from several facial parts and body options.	Graphic selection menu provides independence for preschooler.	
First Categories	Laureate Learning Systems	2-up	Picture identification with categorization, uses scanning for choice making. Categories include: animals, body parts, clothes, foods, utensils and vehicles.	Echo Speech Synthesizer required. IIgs version offers Mouse input.	Touch Window Switch Paddles Joystick
First Verbs	Laureate Learning Systems	2-up	Picture identification of forty verbs; trains scanning and choice making. Helps develop action vocabulary through a variety of input methods.	Echo Speech Synthesizer required.	
First Words	Laureate Learning Systems	2-up	Picture identification program, scan training and choice making stressed. Trains comprehension of fifty nouns arranged in ten categories.	Echo Speech Synthesizer required.	
Fish Scales	DLM	3-up	Six games to introduce a child to measurement concepts.	Lively songs, sound effects and colorful graphics add to the fun.	
Getting Ready To Read And Add	Sunburst	4-7	Programs help student identify and match shapes, upper/lower case letters and numbers.	Children enjoy animation and sound.	Joystick Muppet Learning Keys
Inside/Outside Opposites	American School Publishers	4-up	Exploratory program introduces and reinforces the meaning of twenty antonym pairs. Nonreaders explore the relationship of opposites by controlling the animation.	Program requires limited number of keys. Sound can be turned off.	
Inside/Outside Shapes	American School Publishers	4-up	Two games for reinforcing shape recognition. Offers practice in matching shapes with their names in the "What is it?" activity.	Good graphics. Easy access using only arrow keys and spacebar/return.	

SOFTWARE NAME	PUBLISHER	AGES	PROGRAM DESCRIPTION	COMMENTS	INPUT PERIPHERALS
Jimmy Jumper/ Prepositions	Exceptional Children's Software	3-5	A short story about Jimmy Jumper the rabbit and his adventures. Story is read through the Echo Speech Synthesizer. Children can move Jimmy by pressing the arrow keys.	Children can "play" with Jimmy Jumper reinforcing the concepts presented.	Paddles Joystick Switch
The Further Adventures of Jimmy Jumper/ Perseverance	Exceptional Children's Software	3-5	In this short story, Jimmy practices, keeps trying, and finally makes it to the top. Program uses the Echo Speech Synthesizer.	Children are free to manipulate the rabbits on the screen as often as they like before advancing the story.	Joystick Switch
Kermit's Electronic Storymaker	Simon and Schuster	4-8	Children can independently create and save their stories of the "Muppets." Easy to use program encourages choice selection and story development.	Excellent documentation includes picture dictionary for young readers.	Joystick
Keytalk	Peal	5-8	For children beginning to read and write. Synthesized speech "says" letters and words as they are typed.	Requires Echo Speech Synthesizer. Documentation suggests activities using a language approach to teach written language.	Muppet Learning Keys
Kids At Work	Scholastic	5-up	A construction program wherein a farm or city scene can be created using up to one hundred objects.	Directionality control is needed for object selection and placement. Pictures can be printed.	
Kids Stuff	Stone and Associates	3-6	Three games to increase basic letter, counting, and word skills. Positive responses are rewarded with graphic animation.	Picture menu allows independent preschool usage.	

SOFTWARE NAME	PUBLISHER	AGES	PROGRAM DESCRIPTION	COMMENTS	INPUT PERIPHERALS
Learn About Animals	Sunburst	3-up	Programs explore nine animals, their homes, food, and offspring. Included are activities for comparison of size and ways animals move. Program provides for creation of real or imaginary animals and mask making.	Fun program! "Catching" the animals is especially enjoyable! Hard to enter; needs adult assistance.	Joystick Mouse Muppet Learning Keys
Let's Go Shopping I and II	UCLA/LAUSD Microcomputer Project	3-5	Two disk program to associate objects with the corresponding store. Store front graphics are motivating for young children.	Rate of presentation of pictures can be modified.	Switch Joystick Paddles
Math And Me	Davidson	3-6	Well designed program to reinforce pre-math and addition skills. Presented sequentially, program grows with the child.	Cursor may be difficult to see in some programs.	Mouse
Memory Building Blocks	Sunburst	4-up	Concentration games matching pairs of pictures, words, letters, shapes and tunes.	Choice of nine game boards with variety of layout designs.	Muppet Learning Keys Touch Window
Mr. And Mrs. Potato Head	American School Publishers	3-8	Through simple programming a child can create a potato character and animate it. Includes three memory games.	Program allows much creativity and problem solving through choice selection.	
Muppet Slate	Sunburst	4-up	Beginning word processing program provides large letters and the use of some pictures for expanded expression or Rebus writing.	Exciting options available for various writing abilities. Students' work can be personalized and printed out.	Muppet Learning Keys
Muppet Word Book	Sunburst	4-up	Program contains five letter and word games plus an early word processor using Muppet characters for motivation.	Several levels and options are available.	Touch Window Muppet Learning Keys
Number Farm	DLM	3-7	Six programs help child to strengthen number recognition and counting skills.	Programs which "compete" with computer encourage cooperation of group of children.	

SOFTWARE NAME	PUBLISHER	AGES	PROGRAM DESCRIPTION	COMMENTS	INPUT PERIPHERALS
Odd One Out	Sunburst	4-12	Five programs allow children to analyze, discriminate and classify pictures, letters or numbers within three levels of difficulty.	Editing of particular programs is provided.	Touch Window
Once Upon A Time...	Compu-Tech	6-12	A three-in-one interactive program allowing children to write, illustrate and print their own story. Graphics include Main Street, Farm and Safari.	Preschoolers will need assistance. Use of an expanded keyboard set up may give a young child more independence.	
1,2,3, Sequence Me	Sunburst	4-up	Users are presented with three parts of a of a sequence and must decide how to order them.	Levels move from pictures to word sequence. No auditory reinforcers.	Muppet Learning Keys
Parquetry And Puzzles	Hartley	4-7	Six games to identify parts of an object, shape or picture depending on picture menu and/or level chosen.	Helpful documentation encourages flexibility through design controls.	
Patterns And Sequences	Hartley	3-5	Programs include shape and pattern matching along with finding missing parts within three levels of difficulty.	Include easy design options along with picture menu.	
Peanuts Picture Puzzler	American School Publishers	4-8	Puzzle program; design and put together four, eight or sixteen piece puzzles.	Variety of control options allows children to create their own puzzles and beat their best time.	
The Playroom	Broderbund	3-up	Program designed to encourage exploration through six different games. Through play, children are exposed to letters, numbers, and time time concepts. There is a print option with the Mixed-Up Toy portion of the program.	Much disk swapping is required for the Apple IIe version; adult supervision needed.	Mouse

SOFTWARE NAME	PUBLISHER	AGES	PROGRAM DESCRIPTION	COMMENTS	INPUT PERIPHERALS
Rainy Day Games	Baudville	4-up	Programs include Concentration, Old Maid, and Go Fish with three different levels of difficulty.	Mediocre graphics make visual discrimination of cards difficult.	Joystick Mouse Touch Window
Reader Rabbit	The Learning Company	4-7	Early reading program provides a series of four sequential games, from letter recognition to word formation.	Prerequisite letter skills necessary.	
Reading and Me	Davidson	4-7	Program reinforces skills from classifying objects to letter and word recognition with limited key input.	Good program for sequential skill development. Cursor may be difficult to see in some programs.	Mouse
Reading Magic Library:					
Jack And The Beanstalk	Tom Synder Productions	2-6	Animated interactive storybooks that occasionally let the child decide what happens next.	Limited key input allows the young user control of the program. Story is personalized by adding child's name.	
Flodd, The Bad Guy	Tom Synder Productions	2-4			
Run Rabbit Run	Exceptional Children's Software	3-8	Arcade type activity moves rabbit through a path, over obstacles to find his way home.	Great small group activity using a switch. Several levels of difficulty available.	Switch
Shape And Color Rodeo	DLM	3-up	Six games to help children practice color and shape recognition skills.	Games range from simple shape matching to color blending.	
Sight Words	UCLA/LAUSD Microcomputer Project	4-up	Program drills on picture/word identification. Functional word categories include school, outside, home, toys, food, and clothing.	Echo Speech Synthesizer cues and reinforces responses. Category, scan speed and switch input can be selected.	Switch
Size And Logic	Hartley	2-6	Four games to reinforce size and pattern concepts, on three different skill levels.	Package includes excellent documentation and material for related activities.	

SOFTWARE NAME	PUBLISHER	AGES	PROGRAM DESCRIPTION	COMMENTS	INPUT PERIPHERALS
Stickybear ABC	Weekly Reader	3-6	Exploratory alphabet program. Touch a letter key and full screen picture appears. Two pictures correspond with each letter.	Color graphics and animation make this program very motivating for preschoolers.	
Stickybear Basketbounce	Weekly Reader	5-Adult	Arcade type games which encourage eye-hand coordination and timing. Excellent sound and graphics.	Good game for two players. Can be slowed down using the Adaptive Firmware Card.	Paddles Joystick
Stickybear Bop	Weekly Reader	5-Adult	Arcade type games which encourages eye-hand coordination and timing.	Can be slowed down using option on AFC. Sound and graphics are excellent.	Joystick
Stickybear Numbers	Weekly Reader	3-6	Allows the child to develop number recognition and build counting skills through play. Spacebar usage demonstrates concepts of more and less.	Updated version uses the Echo Speech Synthesizer.	
Stickybear Opposites	Weekly Reader	3-6	Explores concept of opposites. Child can change back and forth (inside/outside) by pressing only two keys.	Three sets of key pairs allow two children, or one with limited reach, to play. Updated version now uses the Echo Speech Synthesizer.	Joystick Paddles
Stickybear Shapes	Weekly Reader	3-6	Three games designed to reinforce shape recognition within a variety of pictures.	Udated version uses the Echo Speech Synthesizer.	Joystick
Survey Of Adaptive Computer Skills	UCPA of W.N.Y.	*	Training and assessment programs for a varley of computer skills using several different input methods.	Utility programs for data collection and device check are included along with skill evaluation survey.	Touch Window Joystick Switch

SOFTWARE NAME	PUBLISHER	AGES	PROGRAM DESCRIPTION	COMMENTS	INPUT PERIPHERALS
The Three Bears	Millenium	3-7	An interactive fairy tale in which a child can explore and determine the plot and ending.	Adult help required for reading. Story can be continued at a later time.	
Tinks Adventure	Mindscape	4-8	In an adventure format, children participate in decision making and *readiness activities.*	Activities allow three levels of difficulty and two related adventures. Encourages cooperative play.	
Words and Concepts	Laureate Learning Systems	3-up	Six programs offering activities on concepts, including vocabulary, categorization, word identification by function, word association, same/alike, and different concepts.	The variety of activities make it desirable to use with young children.	Touch Window Switch

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Although all of the programs above are designed to work with the standard Apple keyboard, with the use of the Adaptive Firmware Card (AFC) all can also be accessed by a switch, expanded keyboard or some augmentative communication device.

APPLE IIgs SOFTWARE SUGGESTIONS

SOFTWARE NAME	PUBLISHER	AGES	PROGRAM DESCRIPTION	COMMENTS	INPUT PERIPHERALS
Charlie Brown's ABC's	American School Publishers	3-7	Alphabet program, press a letter on keyboard and letter appears, press again and see animated picture.	Updated version uses digitized speech. A print option is available.	
Charlie Brown's 1,2,3's	American School Publishers	3-7	Double sided disk provides a variety of pre-math activities using the Peanuts Gang as motivators.	Animation used as a reward. Graphics, sound and animation are excellent.	
Kidstime II	Great Wave Software	3-up	Disk includes three activities: letter recognition, an introductory music program, and Dot-To-Dot games.	Variety of programs for preschoolers.	Mouse
McGee Series:					
McGee	Lawrence Productions	2-6	Fun, easy program for young children. Move McGee through the house, watching TV, using the phone, playing outside, etc., while he waits for mom to get up.	These child-centered programs include realistic sounds and animation. Mouse driven picture menus provide independent exploration activities for young children.	Mouse
McGee Visits Katie's Farm	Lawrence Productions	2-6	Katie's Farm is the second in the McGee's series for young children. Great way to introduce and reinforce: object/shape recognition, spatial relationships, eye/hand coordination, cause/effect, and story telling, while McGee explores the farm.		Mouse
McGee at the Fun Fair	Lawrence Productions	2-6	McGee and his friend Tony spend a day at the Fun Fair in the park. They meet a juggler, a clown, and a one-man-band. Things to do, places to play, fun things to eat are all included.		Mouse

SOFTWARE NAME	PUBLISHER	AGES	PROGRAM DESCRIPTION	COMMENTS	INPUT PERIPHERALS
My Paint	Saddleback Graphics Co.	3-up	A paint program made especially for children. Includes the usual coloring book features with the added fun of flashing colors, a multi-colored brush, and sounds for each picture. Children can also choose to create their own picture.	The surprise picture option and the mirroring technique are very motivating. No printing option offered.	Mouse
Once Upon A Time... Volume I	Compu-Tech	6-12	A three-in-one interactive program allowing children to write, illustrate and print their own story. Graphics include Main Street, Farm and Safari. Digitized speech included.	Preschoolers will need assistance. Use of an extended keyboard set up may make this program more accessable for the young child.	Mouse
Peanuts Maze Marathon	American School Publishers	4-8	Program offers mazes to be completed and rewards are animated Peanuts characters.	Updated version uses digitized speech. A print option is available.	
Peanuts Picture Puzzler	American School Publishers	4-8	Puzzle program; design and put together four, eight or sixteen piece puzzles.	Updated version uses digitized speech.	
Print Shop	Broderbund	4-up	Program to create signs, greeting cards, posters, and stationery with limited key input. Expanded version for the IIgs.	User friendly program encourages creativity and choice selection.	Joystick Koala Pad
Seasons	UCLA/LAUSD Microcomputer Project	3-5	Game for exploring items relating to the four seasons. A season is selected from the menu, children choose objects that go with that season as they are presented.	Objects are animated on the seasonal picture. A print option is included when all related items are selected.	Mouse Touch Window Switch
Talking Reader Rabbit	The Learning Company	3-7	Early reading program provides a series of four sequential games from letter recognition to word formation, with the added feature of digitized sound.	Reader Rabbit's voice adds fun and motivation to the program.	

SOFTWARE NAME	PUBLISHER	AGES	PROGRAM DESCRIPTION	COMMENTS	INPUT PERIPHERALS
Talking Stickybear Alphabet	Weekly Reader	3-6	Three alphabet programs: Alphabet, Letter Hunt and Fast Letters offer a variety of alphabet activities within levels of difficulty.	Great graphics! Updated version uses digitized speech.	Joystick
Talking Stickybear Opposities	Weekly Reader	3-6	Program explores opposite concepts. Child needs to press only two keys to explore these concepts.	Arrow keys needed to activate this version. Updated version uses digitized speech to identify concepts.	Joystick
Talking Stickybear Shapes	Weekly Reader	3-6	Three games designed to reinforce shape recognition within a variety of pictures.	Updated version uses digitized speech.	Joystick
There's A Mouse In The Toy Box	Don Johnston Developmental Equipment, Inc.	3-up	There are nine fun filled activities to train for Mouse use. The activities are designed to provide practice with "point and click" and "click and drag." Activities range from cause/effect to sequencing.	Great program! Several levels of difficulty help with skill development.	Mouse
The Ugly Duckling	The Byte Works, Inc.	3-up	A storybook disk which may be read in three ways. It also gives the user an exciting chance to participate by helping the ugly duckling decide what to do. Can be printed in full color or as a coloring book.	Easy access makes this program appropriate for a group activity or as an individual activity.	Mouse

FAVORITE PRINTING PROGRAMS

SOFTWARE NAME	PUBLISHER	AGES	PROGRAM DESCRIPTION	COMMENTS	INPUT PERIPHERALS
Ceative WritingSeries: Creation Dinosaur Days Jumbled Jungle Monsters and Make Believe	Pelican/ Learning Lab	4-up	Creative graphics programs which can use animation and written text. Scenes are designed for dinosaurs, animals, magical characters and everyday props. Several print options available.	Preschoolers may need adult guidance. Encourages descriptive expression for newly created characters.	Mouse
Electric Crayon Series: Opposites Attract Dinosaurs are Forever Fun on the Farm Holidays and Seasons Letters for You	Polarware	3-up	Coloring book programs provide a variety of pictures which can be colored over and over again. Several print options available including picture with calendar.	Clear graphics, directionality skills required. Popular activity with preschoolers.	Mouse Joystick Koala Pad
The Print Shop	Broderbund	4-up	Program to create signs, greeting cards, posters, and stationery with limited key input.	User friendly program encourages creativity and choice selection.	Joystick Koala Pad
The Print Shop Graphics Library	Broderbund		One hundred and twenty addtional graphics for Print Shop. Includes holiday themes along with animals, games and kids in school.		
Sesame Street Print It	Hi-Tech Expressions	4-up	Print program lets you create signs, cards, posters, banners, and calendars using Sesame Street characters.	Prints in black outline form only.	
Stickybear Printer	Weekly Reader	4-up	Program for designing custom pictures, stories, and cards using a variety of backgrounds, objects, and Stickybears.	Preschoolers not able to use independently as reading skill is required. Resuts are of very good quality.	

SOFTWARE NAME	PUBLISHER	AGES	PROGRAM DESCRIPTION	COMMENTS	INPUT PERIPHERALS
Super Print	Scholastic	3-up	Graphics program for creating posters, signs, cards, banners, and calendars in sizes from card to door-size!	Good graphics. Oversized posters fun for kids to color in a group activity.	
Teddy Bear-rels of Fun	DLM	3-up	A print program which allows design of pictures, posters, etc., with easy to use features. Comes complete with a library disk of extra selections.	Included in package is a special activities booklet. Prints several sizes as outline or in color.	
Walt Disney Card and Party Shop	Bantam	4-Adult	Program allows custom design of party items, from invitations to banners with cards and stationary using Walt Disney characters.	Picture menu allows easy access. Custom designs can be saved.	

SWITCH SOFTWARE

SOFTWARE NAME	PUBLISHER	AGES	PROGRAM DESCRIPTION	COMMENTS
Animal Scan	Public Domain	3-up	Scan training program using three boxes for scanning in a motivating way. A "hand" in one of three boxes "catches" the animal as it passes across the screen.	Echo Speech Synthesizer required.
Big/Little I	UCLA/LAUSD Microcomputer Project	3-up	Concepts of big and little are reinforced using pictures of common objects.	Wonderful graphics; uses a teddy bear cursor for choice making. Echo Speech Synthesizer required.
Big/Little II	UCLA/LAUSD Microcomputer Project	3-up	Concepts of big and little reinforced through choice making to construct a big or little bear.	Vertical scan used for choice making. Echo Speech Synthesizer required.
Build A Scene	R.J. Cooper & Associates	3-up	Choose scenes from beach, breakfast, park or zoo. Can be programmed for continuous or one effect per switch activation. Parts of the scene animate with switch press.	Progressive type of cause/effect program. Echo Speech Synthesizer required.
CAI Motor Training Games	Public Domain	18 mos. - up	Training games requiring various cognitive abilities.	Games are operated by one or two switches.
Catch The Cow	Jana Birch	3-up	Assesses and trains children to operate a scanning program in a non-academic format relying on row/column scanning and waiting skills.	Excellent assessment tool. Compiles data on each student. Provides choice of manual or rated autoscan.
C.A.T.S. Computer Activity	Public Domain	18 mos. - up	Single switch program using simple animated graphics. One press activates graphic; second press clears it.	Children enjoy this beginners' program. Simple animation is motivating.

SOFTWARE NAME	PUBLISHER	AGES	PROGRAM DESCRIPTION	COMMENTS
Creative Antics Creature Capers	Laureate Learning Systems	18 mos. - up	Each disk contains five programs which train for and strengthen cause/effect skills.	A touch on the switch causes characters to animate. Echo Speech Synthesizer required.
Creature Chorus	Laureate Learning Systems	18 mos. - up	Six activities for cause/effect skills. Focused area decreases from total screen to specific creature for animation. Programs encourage choice selection.	Sound, graphics and animation are of excellent quality. Echo Speech Synthesizer required.
The Dinosaur Game	UCLA/LAUSD Microcomputer Project	3-up	Game Board activity for one to four players using dinosaurs as tokens. Strengthens turn taking skills, following directions and learning rules of a game.	Echo Speech Synthesizer cues for turns and winners along with dinosaur introductions.
Early And Advanced Switch Games	R.J. Cooper & Associates	2-up	Thirteen programs assess and develop cause/effect, timing and matching skills with single switch access.	Echo Speech Synthesizer personalizes programs, cues, prompts and rewards students.
Early Concepts	UCLA/LAUSD Microcomputer Project	3-up	Picture based scanning program for object association and missing parts for one to four players. Scan speed can be adjusted.	Echo Speech Synthesizer cues and prompts each student.
Early Learning Series: Early Learning I	Marblesoft	3-6	Four programs introduce and develop color, number, letter and shape concepts in a sequential manner.	With choice of several alternate input devices, programs meet individual needs. Echo Speech Synthesizer cues, corrects and rewards the student. Programs can be modified to accept yes/no response, and work on several levels of difficulty.
Early Learning II	Marblesoft	4-8	Addition and number sequence skills are strengthened through a developmental sequence of programs.	
Early Learning Mix 'N' Match	Marblesoft	3-7	Classification, discrimination and patterning skills are developed through various levels.	
Eency Weency Spider	UCLA/LAUSD Microcomputer Project	2-5	Scanning skills are trained within a familiar nursery rhyme and board game format.	Scan speed can be changed. Echo Speech Synthesizer cues for turns and directions.

SOFTWARE NAME	PUBLISHER	AGES	PROGRAM DESCRIPTION	COMMENTS
Fast Food Game	UCLA/LAUSD Microcomputer Project	3-up	Board game for socialization, turn taking, and following directions for one to four players.	Uses familiar fast foods in a game setting. Echo Speech Synthesizer required.
First Catagories	Laureate Learning Systems	2-up	Picture identification with categorization, uses scanning for choice making. Categories include: animals, body parts, clothes, foods, utensils and vehicles.	Echo Speech Synthesizer required.
First Verbs	Laureate Learning Systems	2-up	Picture identification with action; trains scanning and choice making. Helps develop action vocabulary through single switch input.	Echo Speech Synthesizer required.
First Words	Laureate Learning Systems	2-up	Picture identification program, scan training and choice making stressed. Trains comprehension of fifty nouns arranged in ten categories.	Echo Speech Synthesizer required.
Interaction Games	Don Johnston Developmental Equipment, Inc.	3-up	Nine games for two players which encourage cooperative play. Games span a variety of skill levels.	The games can be personalized with the use of the Echo Speech Synthesizer.
Interaction Games II	Don Johnston Developmental Equipment, Inc.	3-up	Interaction Games II presents six games for two players, designed to provide a natural setting for experiencing cooperation and competitive play.	Echo Speech Synthesizer required.
Let's Go Shopping I and II	UCLA/LAUSD Microcomputer Project	3-5	Two disk program to associate objects with the corresponding store. Store front graphics are motivating for young children.	Rate of presentation of pictures can be modified. Echo Speech Synthesizer required.
Make It Happen	Don Johnston Developmental Equipment, Inc.	2-up	Eight cause/effect programs designed for single switch access. Graphics are clear and auditory cues are appropriate.	Helpful documentation for skill development. Echo Speech Synthesizer required.

SOFTWARE NAME	PUBLISHER	AGES	PROGRAM DESCRIPTION	COMMENTS
Master Blaster	Project ACTT	*	Switch game for two children to increase visual attending and response time.	Requires Echo Speech Synthesizer. Response time recorded and printable.
Matching Games	Public Domain	3-up	Activities develop skills in counting, scanning and directionality.	A variety of programs for switch training, matching and manipulation games.
Micro-LADS	Laureate Learning Systems	4-up	Each of the seven Micro-LADS diskettes trains and tests auditory and/or reading comprehension of different grammatical constructions.	Clear graphics and reinforcers. Echo Speech Synthesizer required.
My Computer Picture Book	Public Domain	18 mos. - up	A single press brings up an animated picture. Screen prompts to press switch.	Simple cause/effect. Graphics okay.
Rabbit Scanner	Exceptional Children's Software	3-up	Assesses and trains children in principles of horizontal scanning and recognition of one-to-one correspondence.	In three separate activities the scan speed, position of object and number of correct responses for advancement can be set. Data is compiled on each child.
Rockets To The Moon	UCLA/LAUSD Microcomputer Project	4-up	Game board activity for one to four players. Encourages basic sequencing, turn taking and color identification skills.	Echo speech output provides cues for turns and winners.
Run Rabbit Run	Exceptional Children's Software	3-8	Arcade type activity moves a rabbit through a path and over obstacles to find his way home.	Great small group activity. Good practice for "press when."
Sight Words	UCLA/LAUSD Microcomputer Project	4-up	Program drills on picture/word identification. Functional word categories include school, outside, home, toys, food, and clothing.	Echo Speech Synthesizer cues and reinforces response. Category, scan speed and keyboard or switch input can be selected.
Survey Of Adaptive Computer Skills	UCPA of W.N.Y.	*	Training and assessment activities for a variety of computer skills using several different input methods.	Utility programs for data collection and device check are included along with skill evaluation survey.

SOFTWARE NAME	PUBLISHER	AGES	PROGRAM DESCRIPTION	COMMENTS
Switch It Change It	UCLA/LAUSD Microcomputer Project	•	Beginning program designed to enhance object identification. Promotes concepts such as cause/effect, turn taking and sharing.	Echo Speech Synthesizer gives verbal cues for pressing switch (names, pictures).
Switch It See It	UCLA/LAUSD Microcomputer Project	•	Program is designed to promote visual scanning from right to left, up and down, on the diagonal. Reinforces concepts such as action words and directionality.	Two levels increase involvement with activity. Echo Speech Synthesizer is required.
Switch 'N' See	Project ACTT	•	Trains cognitively young individuals to operate a switch to develop cause/effect relationships. Holding down switch keeps pictures and music activated.	Uses four different pictures with music background.
Switchpic	Jana Birch	•	Introductory picture show for cause/effect training.	Trains children to change picture on monitor by single switch activation.
Switches, Pictures And Music	Public Domain	•	Switch training programs offering choices of songs and pictures shown on screen.	A variety of song and picture options are included.
Where is Puff?	UCLA/LAUSD Microcomputer Project	3-5	Early preposition program including: in, on, under, in front of, in back of, and next to.	Scan speed can be customized and data collected (Spanish version available). Echo Speech Synthesizer required.

TOUCHWINDOW SOFTWARE

SOFTWARE NAME	PUBLISHER	AGES	PROGRAM DESCRIPTION	COMMENTS
Build a Scene	R.J. Cooper Associates	3-up	Choose scenes from beach, breakfast, park or zoo. Quadrants of the screen change with touch.	Progressive type of cause/effect program.
Color Me	Mindscape	4-up	A drawing and coloring kit where children can create, color and print out pictures from the screen.	Additional disks with new pictures to color are available.
Creature Antics Creature Capers	Laureate Learning Systems	18 mos. - up	Each disk contains five programs which train for and strengthen cause/effect skills.	A touch on the screen causes characters to animate. Requires Echo Speech Synthesizer.
Creature Chorus	Laureate Learning Systems	18 mos. - up	Six activities for cause/effect skills. Touch area decreases from total screen to specific creature for animation. Programs encourage choice selection and pointing skills.	Sound, graphics and animation are of excellent quality. Echo Speech Synthesizer required.
Early Learning Series:				
Early Learning I	Marblesoft	3-6	Four programs introduce and develop color, number, letter and shape concepts in a sequential manner.	With choice of several alternate input devices, programs meet individual needs. Echo Speech Synthesizer cues, corrects and rewards the student. Programs can be modified to accept yes/no response, and work on several levels of of difficulty.
Early Learning II	Marblesoft	4-8	Addition and number sequence skills are strengthened through a developmental sequence of programs.	
Early Learning Mix 'N' Match	Marblesoft	3-7	Classification, discrimination and patterning skills are developed through various levels of difficulty.	

SOFTWARE NAME	PUBLISHER	AGES	PROGRAM DESCRIPTION	COMMENTS
Explore-A-Software:				
Rosie The Counting Rabbit	Wm. K. Bradford	5-7	This series is designed to stimulate and develop reading and writing skills. Programs allow the manipulation of background scenery, character addition with animation and text writing directly on the screen. Three print options are also included. Easy to use picture menus give even the very young child control over this program.	This creative and open ended series provides a vehicle for exploring story book design and development. TouchWindow can be used more successfully with "Me Too!" and/or AFC Access: TouchWindow.
Just Around the Block	Wm. K. Bradford	5-7		
The Bald-Headed Chicken	Wm. K. Bradford	5-7		
Where Did My Toothbrush Go?	Wm. K. Bradford	4-up		
What Makes A Dinosaur Sore?	Wm. K. Bradford	4-up		
Explore-A-Classic:				
The Three Little Pigs	Wm. K. Bradford	3-up	The Explore-A-Classic program consists of three parts: the story teller, the story maker and the activities. The story teller is similar to a pop-up book that is partially animated. The story maker helps children tell stories and begin to write their own. Activities give children further opportunities to practice working with word concepts, counting, labeling, classification and construction tasks.	Program allows creative interactions within favorite stories.
First Words First Verbs First Categories	Laureate Learning Systems	2 -up	Picture identification programs. Provides experience in scanning and choice making. Trains comprehension of fifty nouns or verbs arranged in ten categories; single switch input also provided.	Echo Speech Synthesizer required.
Memory Building Blocks	Sunburst	4-up	Concentration games matching pairs of pictures, words, letters, shapes or tunes.	Choice of nine game boards with variety of layout designs makes this program adaptable for children of different ability levels.

SOFTWARE NAME	PUBLISHER	AGES	PROGRAM DESCRIPTION	COMMENTS
Micro-LADS	Laureate Learning Systems	4-up	Each of the seven Micro-LADS diskettes trains and tests auditory and/or reading comprehension of different grammatical constructions.	Clear graphics and reinforcers. Echo Speech Synthesizer required.
Muppetville	Sunburst	4-6	Six games with the Muppets strengthen recognition of color, shape, numbers and sound patterns. Two concentration type games included.	Ease of use encourages preschooler independence.
Muppet Word Book	Sunburst	4-up	Program contains five letter and word games plus an early word processor using Muppet characters for motivation.	Editing options are provided.
Odd One Out	Sunburst	4-12	Five programs allow children to analyze, discriminate and classify pictures, letters or numbers within three levels of difficulty.	Editing of particular programs is provided.
Rainy Day Games	Baudville	4-up	Activities include Concentration, Old Maid, and Go Fish with three levels of difficulty.	Mediocre graphics make visual discrimination of cards difficult.
Survey Of Adaptive Computer Skills	UCPA of W.N.Y.	•	Training and assessment programs for a variety of computer skills using several different input methods.	Utility programs for data collection and device check are included along with skill evaluation survey.
Talking Nouns I Talking Verbs I	Laureate Learning Systems	3-up	Interactive programs designed to encourage language exploration and growth. Uses TouchWindow as a touch tablet, and allows child to "speak" in full sentences.	Needs Echo Speech Synthesizer. Uses First Words and First Verbs vocabulary.

SOFTWARE NAME	PUBLISHER	AGES	PROGRAM DESCRIPTION	COMMENTS
Talking TouchWindow	Edmark Corporation	•	This program is an authoring system for creating activities and lessons for the Touch Window. The program offers different styles of lessons from "Touch and Talk" to "Question and Touch" mode. Graphics can be user made or "lifted" from other graphic libraries.	Nontechnical program is user friendly with unlimited possibilities. Echo Speech Synthesizer required.
Touch And Match	Exceptional Children's Software	2-up	Programs include matching shapes and objects along with categorization activities. Responses are tabulated for right/wrong answers.	Nice graphics. Edit option available.
Touch 'N' Write	Sunburst	5-8	Children practice manuscript letter writing on the TouchWindow. Letters are finger painted on the screen. Rewards include printable certificates and pages to be "colored" on the screen.	Program records student's progress. Lessons can be custom designed or followed in Palmer sequence.
Wheels On The Bus I	UCLA/LAUSD Microcomputer Project	18 mos. - 3 yrs.	Familiar preschool song in TouchWindow format. Touch the picture and the verse is sung.	Fun program for young children; nice graphics. Echo Speech Synthesizer is required.
Wheels On The Bus II	UCLA/LAUSD Microcomputer Project	18 mos. - 3 yrs.	Another set of verses for the Wheels On The Bus. Choose by pressing one of five pictures on the screen.	Good graphics; very motivating for the young child. Echo Speech Synthesizer required.
Windoware: Touch Graphics/ Interactive Book I	Edmark Corporation	3-up	Package includes Touchwriter, Touch Graphics and two games along with activities designed for Interactive Book which uses the TouchWindow as a touch tablet.	Can be used as touch screen or tablet; allows most direct access and immediate response.

POWERPAD SOFTWARE

SOFTWARE NAME	PUBLISHER	AGES	PROGRAM DESCRIPTION	COMMENTS
Buddy's Body	UCLA/LAUSD Microcomputer Project	18 mos. - 3yrs.	Program reinforcing face and body part concepts with speech output and animation. Has separate overlays for face and body parts.	Echo Speech Synthesizer for cues and rewards. Must touch both legs, ears, etc., for correct answer.
Bear Jam	Dunamis	3-6	Games which allow child to recognize and copy shapes and colors.	Monitor colors are often inconsistent with overlay.
Community Vehicles	UCLA/LAUSD Microcomputer Project	3-up	Three program levels exploring concepts about vehicles used in the community and the people who drive them. Five vehicles included on overlay.	Uses the Echo Speech Synthesizer for cues, explanations and prompts.
The Costume Ball	DIL	4-7	Creative program which allows children to design a large variety of specially costumed characters.	Includes choice of three costume parts. Can be printed.
Early Learning Series:				
Early Learning I	Marblesoft	3-6	Four programs introduce and develop color, number, letter and shape concepts in a sequential manner.	With choice of several alternate input devices, programs meet individual needs. Echo Speech Synthesizer cues, corrects and rewards the student. Programs can be modified to accept yes/no response, and work on several levels of difficulty.
Early Learning II	Marblesoft	4-8	Addition and number sequence skills are strengthened through a developmental sequence oi programs.	
Early Learning Mix 'N' Match	Marblesoft	3-7	Classification, discrimination and patterning skills are developed through various levels difficulty.	
Family Fun	UCLA/LAUSD Microcomputer Project	18 mos. - up	Program with family members and household items represented graphically on overlay.	Can be utilized as matching activity or representational play. Uses Echo Speech Synthesizer.

SOFTWARE NAME	PUBLISHER	AGES	PROGRAM DESCRIPTION	COMMENTS
Feelings	UCLA/LAUSD Microcomputer Project	3-5	Three activities develop an understanding of emotions in a variety of situations. Experiences include "How do you feel when..." and accepts more than one selection.	The Echo Speech Synthesizer cues and prompts the student. Graphics are excellent.
Flowers And Leaves	DIL	4-7	In this two part program a child must match blinking outline to a flower or leaf and then remember their order on the screen.	Excellent for shape recognition and memory skills in a non-threatening manner.
Flower Pollination	DIL	4-7	Program depicts the final result of the pollination process in an age appropriate manner.	Exploratory program encourages awareness of outside factors on plant growth.
Gardening Step By Step	DIL	4-7	As a follow-up activity to story book provided, a child duplicates sequence of gardening activities.	Cueing techniques are non-threatening and lead to independent skill development.
Gardening Tools	DIL	4-7	Program allows selection of one of eight gardening tools to show its function.	Child practices short term memory skills in an informational manner.
Growing A Bean	DIL	4-7	Exploratory program which depicts the four elements necessary for plant growth.	Rewards for correct selection include "growth" of bean seed on screen.
Hot And Cold Foods	DIL	4-7	Program to create a pictured meal and determine hot/cold classification of selected foods.	Created meal picture can be printed.
If You're Happy And You Know It	UCLA/LAUSD Microcomputer Project	2-up	Interactive program of a favorite preschool song. Pressing one of five pictures on overlay results in a new verse.	Sound and graphics are great for young children. Echo Speech Synthesizer required.
Maze With Match-Ups	DIL	4-7	A maze activity of obstacles with space and treasure hunt riddles to solve.	Child must be very accurate for successful movement through the maze.

SOFTWARE NAME	PUBLISHER	AGES	PROGRAM DESCRIPTION	COMMENTS
Micro Illustrator	Dunamis	4-up	Create pictures on monitor by drawing with finger or stylus on PowerPad overlay. Menu allows selection of brush stroke, color and shape design.	Picture can be saved or printed with a graphic dump button.
My Own Garden	DIL	4-8	Child "plants" one of the six seeds in one of three rows and sees the seed "grow" into a corresponding plant on the monitor.	Excellent exploratory program which can be printed out.
Occupations	UCLA/LAUSD Microcomputer Project	3-up	Program for 1-4 players, identifying community helpers. Two levels available: (1) select any picture; (2) child choses the community helper associated with the scene depicted on the screen.	Helpers include: fireman, teacher, police officer, gas station attendant, dentist, doctor. Echo Speech Synthesizer required.
Occupations/ Transportation	DIL	4-7	Children must match a character to the means of transportation on screen. Includes air, land, and sea travel.	Responses are instructive and non-threatening.
Old MacDonald I and II	UCLA/LAUSD Microcomputer Project	18 mos. - 5 yrs.	Two programs using same overlay. Program I explores farm animals and their sounds. Program II is a preposition program using animals in a farm scene on the monitor.	Graphics and sound are excellent. Children enjoy singing along with favorite song. Echo Speech Synthesizer required.
Padded Food	UCLA/LAUSD Microcomputer Project	2-5	Program overlay depicts familiar foods which can be used for matching or categorization.	Overlay can be masked to limit choice selection. Echo Speech Synthesizer required.
Padded Vehicles	UCLA/LAUSD Microcomputer Project	3-up	Similar to Community Vehicles using more pictures. Promotes concepts of transportation/transportation vehicles, and identification words. Ten vehicles depicted.	Good presentation of transportation vehicles. Echo Speech Synthesizer required.

SOFTWARE NAME	PUBLISHER	AGES	PROGRAM DESCRIPTION	COMMENTS
Paper Dolls I Dress Me First	UCLA/LAUSD Microcomputer Project	18 mos. - 3 yrs.	Program overlay includes five articles of clothing to sequentially dress the paper doll (boy or girl).	Uses Echo Speech Synthesizer to teach sequential dressing skills.
Paper Dolls II Dress Me Too	UCLA/LAUSD Microcomputer Project	3-5	Program overlay includes eleven articles of clothing to dress the paper doll (boy or girl). School day, rainy day, sunny day, or silly day are options.	Uses Echo Speech Synthesizer. Program promotes representational play along with sequencing skills.
Parts Of A Flower	DIL	4-7	Program includes placement and color match of model flower.	Good visual motor skills required. Color is inconsistent with overlay.
Ricochet's Costume	DIL	4-7	Sequence and memory program which requires story book recall.	Story book is included. The story itself encourages discussion of social relationships.
Sharp/Not Sharp	DIL	4-7	Classification program for nine objects to determine "sharpness."	Reward animation includes safety reminders.
Silly Sandwich	UCLA/LAUSD Microcomputer Project	2-up	Fun program, where children choose from six or twelve pictures on the overlay to identify to make a silly sandwich.	Program encourages cooperative play. Results can be printed. Echo Speech Synthesizer required.
Talking Power Pad	Public Domain	*	An authoring system that allows the creation of individual talking communication boards, using four, nine, sixteen, or thirty-six area options.	Requires Echo Speech Synthesizer.
Talking Nouns I Talking Verbs I	Laureate Learning Systems	3-up	Interactive programs designed to encourage language exploration and growth. Uses PowerPad as a touch tablet, and allows child to "speak" in full sentences.	Requires Echo Speech Synthesizer. Uses First Words and First Verbs vocabulary.
This Is The Way We Wash Our Face	UCLA/LAUSD Microcomputer Project	18 mos. - 3 yrs.	Familiar song format contains five verses in picture form on overlay. Use related objects for enhanced activity.	Uses Echo Speech Synthesizer. Sound and graphics are excellent for preschoolers.

SOFTWARE NAME	PUBLISHER	AGES	PROGRAM DESCRIPTION	COMMENTS
Trees And Seasons	DIL	4-7	Child chooses the tree which corresponds to the season on the screen and positions it on the background.	Good visual discrimination program along with directionality trainer. Results can printed.
Vegetables And Their Leaves	DIL	4-7	Program allows determination of edible versus non-edible parts of vegetables with an emphasis on conservation.	Child decides by touching part of a vegetable, whether it should be made into soup or given to a rabbit.
Water - 3 Ways	DIL	4-7	Through a maze program, a child must differentiate water in its different states.	Child must be accurate for directional success.
Wheels On The Bus I	UCLA/LAUSD Microcomputer Project	18 mos. - 3 yrs.	Nursery school song that is activated to sing a given verse by pressing one of five pictures on overlay.	Sound and graphics are excellent motivators for preschoolers. Uses Echo Speech Synthesizer.
Wheels On The Bus II	UCLA/LAUSD Microcomputer Project	18 mos. - 3 yrs.	Another set of verses for the Wheels on the Bus, choose by pressing one of five pictures on overlay.	Good graphics; very motivating for the young child. Echo Speech Synthesizer required.
Worm Squirm	UCLA/LAUSD Microcomputer Project	3-5	A good maze introduction program as directional arrows are clearly defined and well spaced on the overlay.	Program is limited to one maze. Echo Speech Synthesizer required.
Zootime	UCLA/LAUSD Microcomputer Project	18 mos. - 3 yrs.	Colorful graphics and animation encourage the young child to explore the world of zoo animals and their actions.	The Echo Speech Synthesizer cues for turns and identifies the task.

- DIL software works with PowerPad or standard keyboard.

MUPPET LEARNING KEY SOFTWARE

SOFTWARE NAME	PUBLISHER	AGES	PROGRAM DESCRIPTION	COMMENTS
Exploratory Play 1) Purse 2) Wind-Up	Peal	18 mos. - 3yrs.	Learning first words and actions with communication board design.	Use with Echo Speech Synthesizer. Set of twelve pictures can be limited to groups of 4, 8, or 12 with plastic masks.
Getting Ready To Read And Add	Sunburst	4-7	Programs help students identify and match shapes, upper/lower case letters and numbers.	Children enjoy animation and sound.
Learn About Animals	Sunburst	3-up	Programs explore nine animals, their homes, food, and babies, along with activities for comparison of size and ways they move. Program provides for creation of real or imaginary animals and mask making.	Fun program! "Catching" the animals is especially enjoyable. Hard to enter; preschoolers need adult assistance.
Memory Building Blocks	Sunburst	4-up	Concentration games matching pairs of pictures, words, letters, shapes or tunes.	Choice of nine game boards with variety of layout designs.
Muppets On Stage	Sunburst	2-up	Programs explore letters, numbers and colors with assistance of the Muppets and their computer keyboard. Can also be used with standard keyboard.	Control option allows selection of specific letters and numbers along with presentation choices.
Muppet Slate	Sunburst	4-up	Beginning word processing program provides large letters and the use of some pictures for expanded expression or Rebus writing.	Editing options available for various writing abilities. Student work can be personalized and printed out.
Muppetville	Sunburst	4-6	Six games with the Muppets to strengthen recognition of color, shape, sound patterns and numbers. Two use concentration type games.	Ease of use encourages preschooler independence.

SOFTWARE NAME	PUBLISHER	AGES	PROGRAM DESCRIPTION	COMMENTS
Muppet Word Book	Sunburst	4-up	Program contains five letter and words games plus an early word processor using Muppet characters for motivation.	Several different levels and options available.
1, 2, 3, Sequence Me	Sunburst	4-up	Users are presented with three parts of a sequence and must decide how to order them.	Levels move from pictures to word sequence. No auditory reinforcers.
Representational Play 1) Beginning Baby 2) Beginning Car	Peal	24 mos. - 5 yrs.	Beginning communication using speech output to learn words and actions commonly used in play.	Can be masked to present 4, 8 or 12 words at a time. Requires Echo Speech Synthesizer.
Talking Touch Pad	BOCES II Holbrook, NY	•	Authoring program allows the Muppet Learning Keys to be programmed as a customized talking communication board.	Requires Muppets Learning Keys and Echo Speech Synthesizer. Demo program allows speech output for all keys on Muppet Learning Keys.

Appendix F Some Ideas for Word Processing in Special Education

Compiled by the
BOCES II Special Education Division
Microcomputer Resource Center
8 43rd Street
Centereach, NY 11720

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The purpose of this guide is to give the special education teacher some ideas upon which to develop his or her own repertoire of word processing activities. The activities described have been collected by asking teachers at BOCES II to describe the kinds of activities they have found useful in their classes. These ideas have come from books, magazines, computer user groups, students, and the grapevine. We in no way take credit for their invention—only their successful use.

We hope you will use this guide as a beginning for your own personal collection. We would also enjoy hearing from you and adding your thoughts to this pool of shared ideas.

Instructions for Using This Guide

There are four columns listed on the next page.

- The first column lists a computer skill that you may wish your students to learn or practice.
- The second column lists the grade level at which that skill is usually introduced.
- The third column lists a code number which corresponds to activities printed on the pages marked "activities."
- The fourth column lists code words which correspond to the names of commercial programs which may be useful in teaching the skills in the first column.

To use this guide:

- Choose a skill you wish to teach or practice from column 1.
- Check the beginning grade level in column 2 to see if you are introducing the skill at the right level.
- Match the activity code numbers in column 3 with those on the activity pages.
- Use your own software programs to carry out the activities or check column 4 for suggested commercial programs to use.

Word Processing Skills

Computer Skills	Beginning Grade Level	Activity Code	Commercial Program Code
Familiarity with keyboard	K	F1-F10	15,1,11,13,14
Use upper & lower case	K	F5-F10	2,8,13,12,14,15
Use return key	K	F1-F10	11,12,13,14,15
Move cursor	K	WP1-3,WP10	11,12,13,14,15
Writing with the keyboard	K	All activities	All
Deleting letters	2	WS10,E1,PSE6	11-15
Scrolling	2	WP3	9
Centering text	2	E2	5,6,7
Indenting with space bar	2	E1	5,6,7
Creating blank lines	2	E3	5,6,7
Loading programs from disks	K	DC1,DC2,MA1,MA2	5,6,7,12
Inserting	3	PSE1,PSE2,PSE6,PSE8	5,6,7,15
Deleting words	3	E3,PSE6,PSE8,E7	12
Retrieving info from disk	2		All
Printing		All WD,PROS Activities 12,15	
Clearing text	4		5,6,7,9,15
Erasing blocks of text	4	PSE8	5,6,7,9
Search & find functions		PSE11	5,6,7,9
Saving info to disk	5	WP4,WP5	12
Formatting disk	5		5,6,7
Clearing files	5		5,6,7
Replacing text	5	SW5,SW10,E6	
Setting tabs & margins	6		7
Setting up special formats	6		7,9

Creative Skills	Activity Code	Commercial Code
Sentence writing	SW1,SW2,SW13,SW9	11,12,15
Sentence expanding	CC55,SW2,SW3,SW4	12,11
Rearranging sentences	SW5,SW13,E1	11,9,12
Combining sentences	SW11	11
Writing paragraphs	CC5,CC7,SW12,PSE7	9,12,15
Expanding paragraphs	SW4,SW8,CC8,SW1 SW5,PSE1,PSE2,PSE4	9,3
Rearranging paragraphs	SW5,SW13,E1	9
Writing descriptions	CC8,CC10,CC11	3,15
Writing comparisons	PSE10	
Writing dialogue	SW9,PSE6	
Freewriting	PSE4	9
Notetaking	CC6,PSE7	3
Composition	SW13	3,11,12,15
Recognizing extraneous material	SW13,10	
Letter writing	CC4,E2	10,7
Changing tone/ meaning	PSE6,PSE1,CC9	9
Proofreading	PSE8,E4,E5,CC9	9,3

Activities

Familiarity with Keyboard

F1. Have teacher or students in older classes make a giant floor chart using magic marker and a plastic tablecloth. The chart should be a giant computer keyboard on which the students hop and play their way to being familiar with the keyboard.

Other Uses:

- The students toss bean bags to the proper keys as teacher calls out a letter or number.
- Teams are chosen. Teacher calls out a letter or number. The student who holds up the proper finger to type that letter goes and stands on the letter. The team that first gets on letters wins.

F2. Color the keys on the floor chart and wall charts so that keys typed with each finger are a separate color. Then color the students fingers (stickers) to match.

F3. Reproduce drawings of the keyboard on cardboard and laminate.

- Let students fill in the key names in crayon for a wipe-off activity that can be done over and over. Let the students fill in the letter names in permanent marker for a keyboard which can go home or be used in the classroom for keyboard practice.

F4. Each student types his own name. Teacher prints list out so that each student has a copy of his friends' names.

F5. Students type alphabet.

F6. Students insert missing letters in an alphabet the teacher has prepared on a disk.

F7. Students type numbers or insert missing numbers in a lesson teacher has prepared on a disk.

F8. Students type all the keys on the keyboard twice, alternating with the shift key.

F9. Students type the alphabet twice using caps and lower case.

F10. Teacher types simple words and student types same word underneath.

Sentence Writing

SW1. The students dictate a sentence. The teacher types it.

SW2. Teacher prepares a screen with each student's name. The student writes a sentence using his name.

SW3. The student or teacher types a sentence. The student is required to rewrite the sentence adding one word. This can be done in a round robin with each student building upon the last student's work. It can then be printed for each student and saved for another day.

SW4. Round robin story – The teacher starts by typing a sentence. Each student or team continues the story by typing in a sentence or two.

SW5. Which came first? – The teacher prepares several sentences on the screen. Students number the sentences in chronological order. More advanced students move the sentences to the proper location. This can be done in reverse, giving the students a story which they take out of chronological order. At a later date, they put it back in order.

SW6. Have students write math word problems. Have them printed and have the class solve them.

SW7. Have the students write definitions for their spelling or vocabulary words in the content areas. Turn the definitions into a crossword puzzle (use Crossword Magic if you have it). Save for a later date when the students will solve the puzzles for review.

SW8. Give students individual data disks. Each day have them write a sentence or two about their day. Include the date. By the end of the year they have a complete diary. These entries may also provide topics for later writings.

SW9. Establish an electronic bulletin board. Turn on the computer and let students leave messages for one another that may only be answered by typing on the computer. This encourages the students to use their writing skills.

SW10. Teacher prepares a set of sentences in which the students "x" out the word or phrase that does not belong. You may do this in reverse by having the students copy sentences from their text and insert words that don't belong.

SW11. Given several sentences, the student combines them to form compound sentences.

SW12. Want ad – Have the student create actual want ads to describe their skills and try to get a summer job.

SW13. Jumbled stories – Prepare paragraphs on disks that are in a jumbled order. Add some paragraphs that don't belong. Have the students move the text into correct order and remove the paragraphs that don't belong.

Paragraphs, Stories

PSE1. Given a short story on screen, the student will change the tone by changing as many modifiers as possible to a more superlative form (e.g., "The cute girl was sad" becomes "The gorgeous girl was depressed beyond reason"). This is a lot of fun and can be done in reverse.

PSE2. Students develop paragraphs though cause and effect statements.

PSE3. Students use their own diary (which they have been adding to each day) and replace all the nouns with synonyms. They may also add modifiers to add interest to their writing.

PSE4. Students turn off the monitor light and write ideas for a story as they come into their heads. This activity sometimes lets the children continue their train of thought without stopping and trying to make typing corrections.

PSE5. Given a story on screen, the student inserts dialogue. This can be done with the diary disks mentioned in PSE3.

PSE6. Let the students write the lyrics to their favorite song and then change all the nouns.

- Rewrite the song in their own words
- Write the song as it might have been written during a period of history they are studying

PSE7. Students go from classroom to classroom interviewing students to get their opinion on cafeteria food. They write up the interview and print it for others to read.

PSE8. Students write directions using too much or too little information. Other students proofread and remove the extra material.

PSE9. Given a set of paragraphs, the student expands each one with more information and places them in a logical order.

PSE10. Using two pictures from magazines or newspapers, students write a paragraph telling how the objects are alike and how they are different.

PSE11. Students are given a text with several words misspelled. Using the search and replace function they correct the text.

Word Processor Fun Skills

WP1. Use magic marker to draw a maze on a piece of plastic used for the overhead projector. Load a word processing program and have the students go through the maze by moving the cursor. For variety, have them print a letter or symbol to trace their path through the maze. Mazes can be as easy or as difficult as you like.

WP2. Students are asked to type designs by typing any key in a required shape. Example – Students may be asked to create any of the following:

- A square made of O's
- A triangle made of X's
- A letter "L" made of letter L's

Older students may type Christmas poems in the shape of a tree or a story about hats in the shape of a hat. Example – One student wrote the title of a report about worms in the shape of a worm.

WP3. Given a story in which the teacher has written one word on each line, the student must scroll the screen to read the story. Have the students create stories like this for others to read.

Editing

E1. Teacher types two short paragraphs from two classroom texts. Instead of typing them in order, first a sentence is typed from one text, then from the other, until both paragraphs are typed. The student's job is to separate the two paragraphs and put them together correctly.

E2. Given a letter typed completely on the left margin, the student inserts spaces to make the typed page fit the standard letter form.

E3. Given a single-spaced document, the students double space it.

E4. Set up proofreading teams in which the proofreader as well as the author get a grade.

E5. Have a conference with students before and after they have proofread their work.

E6. Break the Code – Give the students a numbered list of words on index cards. Load a prewritten poem that has numbers instead of words in some places. Have the students replace the number with the correct corresponding word on the index card.

E7. Wacky Recipes – Have students write recipes for their favorite foods. Then have them get a copy of the real recipe and compare. If you assign recipes such as breads and cakes to young children, the results are often a lot of fun!

E8. Have students copy a real recipe, then substitute "silly" words for the measurements. Example – Instead of teaspoon, write shovelful; instead of cup, write bucket.

Creative Composition

CC1. Synonym Replacement – Give the students a list of familiar sayings. The students tell what the saying means (in their own words). They rewrite the saying using synonyms from the thesaurus. Example – He was as blind as a bat. Meaning: He couldn't see well. Rewrite: He was visionless as a flying rodent.

CC2. Who, What, Where, When, How – Students compose a story together. Each student is in charge of one word, such as "who," what," etc.

CC3. Choose a photograph of several friends. Have individual students enter dialogue for each person in the picture. Print out the results. Paste the picture on top. Redo the activity the next day creating new dialogue.

CC4. Have students pretend they are a famous person they have studied. Then pretend they are writing a letter home to tell what their life is like. Collect the letters and save to disk. Make a bulletin board with unsigned letters or first names only. Invite others to guess who the letters are from or what event in history is being discussed.

CC5. On the screen, give the students the beginning sentence and ending sentence of a paragraph or story. They have to fill in the middle.

CC6. Notetaking in Reverse – Have the students erase all but the key words to a paragraph you have prepared for the screen. What is left is note taking. Reverse the process and give them several key words and ideas which they build into a paragraph.

CC7. Have one or more students type a paragraph from a classroom text. Then have the students add a sentence that does not belong. Switch disks and try to find and delete the sentence which doesn't belong.

CC8. Give students a magazine picture of a person, place, or thing.

- On the word processor, have them "paint the picture with words." Print the description and save to disk.
- On the following day, add modifiers to the description.
- Continue until students have written descriptions of a person, place, and thing. Print descriptions and paste pictures on top of text.
- Use the person, place, and thing described to write a plot outline and then a story.

CC9. Write a Sentence – Have the first student change a word and add a word. Continue this way until each student had a chance. Print up the sentences and read aloud.

CC10. Choose a picture of a person, place, or thing from a magazine. Have students imagine they must write sentences to describe the thing through each of their senses (sight, smell, hearing, etc.). Print sentences. Have students describe objects with sentences including the word "like." Example – The forest smells like _________. The forest looks like __________.

CC11. Give the students a list of verbs and have teams try to create definitions for them. Save to disk. Have other teams try to improve them. Have definitions read aloud or printed and have remainder of students try to figure out the word that was defined.

CC12. Have students write directions for a "do-it-yourself manual." Example – How to make a peanut butter sandwich, paper airplane, etc. Save it to disk. Print them. Have other students act out exactly what the directions say. Go back to the computer and improve your directions.

CC13. Verbal Rube Goldbergs, or Off Beat Way to Do Things – Start with a set of directions. Example – How to butter bread. Try to think of silly ways to do this (e.g., use a paint brush to spread the butter). Save to disk. Print them and use them for discussions of humor. Reverse process and make silly directions back into normal directions.

Commercial Product Code

1. Muppets Learning Keys/Muppets on Stage
2. Microtype
3. Writing Adventure

4. Kidwriter
5. Bank Street Writer
6. Magic Slate
7. PFS Write
8. Scholastic Compugarten Texts
9. Scholastic Bank Street Activity Files
10. Bank Street Mailer
11. I Can Write
12. Be a Writer
13. Muppet Word Book (P-1)
14. Sticky Bear Typing
15. Snoopy Writer

Software Review

Bank Street Activity Files (Scholastic)
Code #9

The activity files are lessons on disks which can be loaded into the computer to practice cursor movement, the search and replace function, scrolling, freewriting, and unscrambling stories. This is not for beginners.

Bank Street Writer (Broderbund) (Scholastic)
Code #5

A powerful word processor easy enough to be used independently by those with elementary reading skills. As students' abilities grow, the program can be used with the Bank Street Speller (a program which checks spelling), the Bank Street Files (a database program), and the Bank Street Mailer. The Scholastic version of the Bank Street Writer has an excellent teacher's manual.

Be a Writer (Sunburst)
Code #12

A writing program for grade 3 to be used with Magic Slate. It is made up of 25 data files which require the following skills: loading, saving, printing files, word order, sentence patterns, and paragraph form.

I Can Write (Sunburst)
Code #11

A writing program for grade 2 to be used with Sunburst's Magic Slate. It includes 25 lessons in 20-column format in which students learn to change, save, and print text while creating a book of their own writings.

Kidwriter (Spinnaker)
Code #4

A writing program that lets kids create their own storybook. Children create colorful scenes from the program's graphics library of 99 pictures and objects. They then write a story to go with the picture.

Magic Slate (Sunburst)
Code #6

A powerful word processor which has the ability to grow with the students. The program may be used in the 20, 40, or 80 column versions; has seven different typestyles and comes with a complete student handbook which can be photocopied. The 20-column version has large type print (on the screen and printer), making it the ideal choice for the very young or the visually impaired.

Microtype, The Wonderful World of Paws (Southwestern Publishing Co.)
Code #2

A keyboarding program for those reading on a fourth grade level. An easy to follow and complete program for teaching keyboarding to beginners. The program emphasizes proper posture, keystroking, and finger searches. A section called "open screen" works like a basic word processor.

Muppets on Stage/Muppet Learning Keys (Sunburst)
Code #1

A specially designed keyboard for young learners which plugs into the computer game port. It features letter and number keys in sequential order plus eight color keys. It comes with a discovery disk called "Muppets on Stage" which teachers letters, numbers, and picture and color recognition.

PFS Write (Scholastic)
Code #7

A powerful word processor which requires an 80-column display. One of the best features of the PFS word processor is its ease of use. The single word menus are easy to read and understand and editing can be done with simple commands as you type in text. The program may be integrated with the PFS File (a database) and the PFS Report (a table generator) programs. Also available from Scholastic are database packages of U.S. history, U.S. government, life science, and physical science.

Scholastic Compugarten Texts (Scholastic)
Code #8

Students at the preschool and elementary level can become familiar with the computer keyboard with these excellent texts. Also available is a 4' x 8' plastic floor keyboard upon which the students hop, jump, and play their way to being familiar with the keys of the computer.

Scholastic Mailer (Scholastic)
Code #10

A special program used with the Bank Street Writer which sets up forms for writing letters.

The Muppet Word Book (Sunburst)
Code #13

A beginning language program which uses the Muppet characters to introduce upper and lower case letters and word endings. The students can write and print a few words in large print using Kermit's word processor. This program may be used with the Apple keyboard, Muppet Learning Keys, touch window, or mouse.

Snoopy Writer (Random House)
Code #15

A story writing program which also familiarizes students with some of the functions of word processing. Easy menus offer the student a choice of writing, filing (saving), customizing (editing), or quitting. Students choose settings and Peanut's characters from the program and then write a story about the picture. Starting sentences may be chosen if desired.

Stickybear Typing (Weekly Reader Family Software, Xerox)
Code #14

A typing program for beginners. The program contains three games which review the keyboard and provide typing lessons on 30 levels of difficulty.

Writing Adventure (DLM)
Code #3

A writing program for those ages 9 and up. The program uses an adventure game format to stimulate the student's imagination. Features include story starters, note cards for taking notes and organizing thoughts, a basic word processor, and a proofreading aid.

Software Publishers

Broderbund Software, Inc.
17 Paul Drive
San Rafael, CA 94903
415-479-1700

Random House School Division
Department 9323
400 Hahn Road
Westminster, MD 21157

Scholastic Software
730 Broadway
New York, NY 10003
212-505-3000

Software Publishing Corporation
1901 Landings Drive
Mountain View, CA 94043

South-Western Publishing Co.
5101 Madison Road
Cincinnati, OH 45227
800-543-0487

Spinnaker Software
One Kendall Square
Cambridge, MA 02139
617-494-1220 for info.
800-826-0706 to order

Sunburst Communications, Inc.
39 Washington Avenue
Pleasantville, NY 10570
914-769-5030
800-431-1934

Weekly Reader Family Software
245 Long Hill Road
Middletown, CT 06457
203-638-2441